ASSESSMENT OF INJECTION SAFETY IN SELECTED LOCAL GOVERNMENT AREAS IN FIVE STATES IN NIGERIA

2012 FOLLOW-UP REPORT

AIDSTAR-One
AIDS SUPPORT AND TECHNICAL ASSISTANCE RESOURCES

APRIL 2013

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ACRONYMS

FMOH	Federal Ministry of Health
GHAIN	Global HIV/AIDS Initiative Nigeria
HCWM	health care waste management
IV	intravenous
LGA	local government area
MMIS	Making Medical Injections Safer
PEP	post-exposure prophylaxis
SIGN	Safe Injection Global Network
TST	temperature, steam, time
USAID	U.S. Agency for International Development
WHO	World Health Organization

EXECUTIVE SUMMARY

This follow-up assessment of injection safety in Nigeria was conducted in five states designated as priorities by the U.S. Agency for International Development (USAID): Bauchi, Benue, Cross River, Lagos, and Sokoto. The assessment used an adaptation of the Revised Injection Safety Assessment Tool (Tool C-Revised) developed by the World Health Organization and covered all injection and blood drawing procedures in 80 public sector health care settings and laboratories.

Between baseline and follow-up, AIDSTAR-One Nigeria organized advocacy visits to policy makers at all levels, organized a training of trainers at the state level, as well as facility based trainings of different cadres of healthcare workers and waste handlers. AIDSTAR-One Nigeria also provided seed stock of safe injection commodities to health facilities on completion of trainings. Supportive supervision then followed with state desk officers, and any challenges that arose were discussed with management for continuous quality improvement.

The assessment, which entailed interviews, observations, and stock assessments in 21 hospitals and 59 lower-level facilities where AIDSTAR-One is working, found significant improvements in injection safety practices at follow-up, however, some challenges still remain.

RISKS TO THE PATIENT

At baseline, loose used sharps waste was identified as a major risk. Though a statistically significant increase in the number of facilities with properly contained infectious waste (non-sharps) was observed at follow-up, disposal of used sharps continues to be a challenge. Statistically significant increases in health facilities with running water and soap for washing hands, as well as facilities with alcohol-based hand sanitizer for cleansing hands, were observed, however, the overall proportions of available hand washing options were still low. After the intervention, the majority of the injections were prepared on a clean work table or tray, a statistically significant increase compared to baseline; however, there was no change in the proportion of intravenous procedures that were prepared on work table or trays with proper hygienic conditions. Across all types of injection equipment, fewer stockouts were reported at follow-up compared to baseline. However, nearly half of facilities did not have a procedure in place for placing emergency orders for injection devices when stockouts do occur.

RISKS TO THE PROVIDER

At follow-up, most facilities had both injection safety and waste management policies in place, and a majority was able to show copies of the policy and guidelines. This was a statistically significant improvement from baseline.

Statistically significant increases were seen in the number of health care facilities with at least one puncture-resistant and leakproof sharps container in all areas where injections and intravenous procedures are performed as well as the number of health care facilities with one or more puncture-resistant sharps container "in stock." Compared to baseline, significantly more injection providers at

follow-up used a barrier to protect their fingers when breaking glass ampoules; however, a majority still did not.

The results at follow-up show more providers use best practices for recapping compared to results from baseline. At follow-up, the majority of providers did not re-cap[1] syringes prior to disposal, which reduces their risk of exposure to blood-borne pathogens, and the difference compared to baseline was found to be significant. Very few providers (4.3 percent) reported experiencing accidental needle-stick injuries in the six months before the follow-up survey.

However, despite the constant risk of possible injury, only 14.6 percent of providers reported that guidelines for post-exposure prophylaxis (PEP) were available. And similar to baseline, one third of providers mentioned that PEP was provided for high-risk exposures. Hepatitis B vaccination did not improve compared to baseline, with still only half of the providers receiving the complete course of three or more doses. However, a majority of injection providers received training on injection safety in the two years prior to the follow-up survey, and communications materials such as job aids were posted in almost all facilities at follow-up, both significant increases from baseline.

RISKS TO THE WASTE HANDLER

A significantly higher proportion of waste handlers were trained on safer ways of handling and disposing of waste at follow-up. Nearly all waste handlers reported that at least one type of equipment was available to protect them from injuries at their workplace; the most common personal protective equipment available was goggles, heavy-duty gloves, latex gloves (which do not offer much protection), and aprons. Needle-stick injuries were rare among waste handlers (3.8 percent), a statistically significant improvement. However, although waste handlers face constant risk of exposure to blood-borne pathogens, less than half of all waste handlers were vaccinated against hepatitis B, and only 32 percent received the full course of three or more doses.

RISKS TO THE COMMUNITY

Better waste management practices at facilities were observed at follow-up compared to baseline. A statistically significant increase in health facilities, in which there were no sharps in an open container in any area of the facility, was observed; however, few facilities made sure that full containers awaiting final destruction were fully closed and stored in a locked area away from public access. One-third of facilities also had used sharps lying around on their grounds, where community members could easily come into contact with them.

This study provides follow-up results for injection safety interventions in new local government areas in five states where project activities were not previously implemented prior to baseline. These results will be used by the Federal Ministry of Health, the five states and focal local government areas, and the AIDSTAR-One project as evaluation materials to gauge the effectiveness of project interventions.

The primary recommendations are as follows:

- The Federal Ministry of Health should ensure that sufficient quantities of national guidelines and other essential policy documents are available in all health facilities.

[1] The practice of replacing a protective sheath on a needle. Two-handed re-capping increases the risk of needle-stick injuries and is not recommended. However, where such action is unavoidable, the one-hand scoop technique is an acceptable alternative in phlebotomy practices.

- Proper personal protective equipment and job aids should be made available, and PEP should be routinely provided in the event of accidental needle-sticks.
- All facilities should continue supportive monitoring of procedures for sharps waste management.
- Advocacy for the safety of health workers, including waste handlers, should be continued through the newly drafted infection prevention and control (IPC) Policy.
- The national and healthcare worker (HCW) hand washing promotion campaign should be encouraged.
- Government at all levels and hospital management should ensure continuous supplies of safe injection commodities to promote best practices.
- Continuous injection safety education should be institutionalized to ensure training and re-training as necessary.

Specific sub-recommendations pertaining to particular elements of injection procedures are included in the full document.

INTRODUCTION

The World Health Organization (WHO) estimates that at least half of the 16 billion injections administered annually in developing countries are unnecessary and often unsafe in the low to middle income countries such as Nigeria. Unsafe injection practices such as the reuse of needles and syringes can contribute to the transmission of HIV and other blood-borne pathogens. Every year unsafe medical injections and their overuse are responsible for 5 percent of all new HIV infections, 32 percent of hepatitis B virus infections, and 40 percent of hepatitis C virus infections.

In collaboration with partners through the Safe Injection Global Network (SIGN), the WHO developed an intervention strategy for reducing unsafe and unnecessary injections. The SIGN strategy has three basic principles:

1. Promote behavior change by health care workers and patients to ensure safe injection practices and reduce unnecessary injections.
2. Ensure availability of equipment and supplies necessary for injection safety.
3. Manage waste safely and appropriately.

Beyond vaccination programs, the issues of injection safety and waste management are not given much needed attention by either governments or the development community, justifying the need for the WHO strategy to ensure safe and necessary injection practices.

IMPROVING INJECTION SAFETY IN NIGERIA

The objectives of the Federal Ministry of Health (FMOH) include the improvement of the quality of care provided at all levels of the health care pyramid. Injection safety and health care waste management (HCWM) in Nigeria have been shown by previous studies to pose a serious health risk (Akpan et al. 2009). AIDSTAR-One, in collaboration with USAID/Nigeria, worked in the area of injection safety with the Government of Nigeria and implementing partners of the U.S. President's Emergency Plan for AIDS Relief for a two-year period (October 2010 through September 2012). AIDSTAR-One provided technical assistance such as training and capacity building, commodity management, HCWM, and behavior change communication and advocacy.

This work is a follow-on to previous injection safety work that began in 2004 by the Making Medical Injections Safer (MMIS) project to address the high burden of injections (4.9 per patient per year [Government of Nigeria 2004]), high demand for injections, and common occurrences of stockouts (about one-quarter of patients brought their own syringe for injection procedures). Two baseline studies conducted at health facilities found that it was common among health workers to re-cap used injection equipment using two hands.[2] Their results also showed that facilities lacked the proper disposal of health care waste and that almost half of the health workers interviewed had experienced a needle-stick injury (Government of Nigeria, 2004). MMIS, together with U.S. Government teams and the ministries and departments of health at the federal, state, and local

[2] Two-handed re-capping increases the risk of needle-stick injuries and is not recommended.

government area (LGA) levels, worked to improve injection practices. In 2010, MMIS ended, after having covered 1,041 public and private health facilities in five target states (Anambra, Cross River, Edo, Kano, and Lagos) and the Federal Capital Territory. MMIS also covered 198 more health facilities in 21 non-target states working with U.S. Government teams.

The following report provides results from baseline in 2011 and follow-up in 2012 which were used to assess the effectiveness of the AIDSTAR-One injection safety WHO three-prong strategy interventions (changing behavior of healthcare workers, patient and communities; ensuring availability of equipment and supplies; and appropriate health care waste management) in public sector health care settings and laboratories across the five states of Cross River, Lagos, Bauchi, Benue, and Sokoto.

METHODOLOGY

An adaptation of the WHO Revised Injection Safety Assessment Tool (Tool C-Revised) was used to collect data. It was designed to determine the extent to which injections, lancet procedures, phlebotomies, and intravenous (IV) injections and infusions were consistent with international safety standards. The tool includes interviews, observations, and stock assessments in a sample of 80 health facilities at baseline and follow-up.

STUDY OBJECTIVES

The purpose of the study was to assess improvements in the safety of injections, phlebotomies, lancet procedures, and IV injections and infusions one year after the project was implemented in five states. Baseline and follow-up results were compared to measure the effectiveness of the intervention to improve injection practices. The objectives are:

1. To determine if facilities meet requirements for practices, equipment, supplies, and waste disposal.
2. To determine whether critical steps for performing procedures comply with best practices.
3. To identify unsafe practices that may lead to infections and that should be targeted for interventions.
4. To estimate the proportion of facilities where procedures are safe.

SAMPLING

The health facility serves as the survey unit for the assessment. The sample of health care facilities was obtained through a mix of purposeful selection of hospitals and random selection of other types of health care facilities in the districts. For the sampling of 80 health facilities in eight clusters, a 90 percent confidence level was used with an 8.75 percent margin of error in accordance with the cluster sampling frame of WHO's Tool C-Revised.

The five target states were selected for the survey by USAID/Nigeria in consultation with the FMOH based on the health indices and the need for technical assistance in the states chosen. In Cross River and Lagos states, where MMIS had previously worked, three LGAs were selected in each for the survey. For the new states (Bauchi, Benue, and Sokoto), six LGAs were selected in each. LGAs for each state were then grouped into clusters of three, for a total of eight clusters, in line with the WHO Tool C-Revised sampling method.

The sample was stratified by facility type. Tertiary and secondary facilities were categorized as hospitals; and public health centers, health posts, or dispensaries were categorized as lower-level facilities. All existing hospitals were purposefully selected in each cluster, while lower-level facilities were randomly sampled using an electronic randomized table based on the total population of the lower-level facilities in each LGA. Overall, 20 hospitals and 60 lower-level facilities at baseline and 21 hospitals and 59 lower-level facilities at follow-up were covered in this survey. For each cluster, two replacement facilities were also randomly selected.

The study was done through observations of various types of injection procedures and interviews with facility personnel who used or handled injection equipment. They included injection providers, laboratory technicians, laboratory supervisors, supervisors of injection providers, and staff in charge of waste management (i.e., waste handlers).

Table 1 shows details of the sampling of facilities and types of injections or blood draws. The following were procedures covered by the study:

- Intramuscular, intradermal, and subcutaneous injections for vaccination, therapeutic, family planning, and dental services
- Phlebotomy through venous and capillary (lancet) procedures
- IV procedures using infusions and injections, either directly into a vein or into an existing IV system.

Table 1. Sampling by Type of Facility

	Sampling	Planned
Observations		
Health care facilities	1 observation per facility	80 facilities
Injection practices	4 observations per facility	320 observations
Phlebotomies, lancets, IV infusions, and IV injections	4 observations per facility	320 observations
Sterilization practices	1 observation per facility	80 facilities
Disposable injection equipment	1 observation per facility	80 observations
Interviews		
Injection providers	8 interviews per hospital / 1 interview per lower-level facility	220 interviews
Supervisors of injection providers	8 interviews per hospital / 1 interview per lower-level facility	220 interviews
Waste handlers	1 interview per facility	80 interviews

ETHICAL CONSIDERATIONS

This survey had confidentiality protections incorporated in its planning and implementation. An application was made to the National Health Research Ethics Committee for the approval of the study. After a review of its methodology, tools, and other essential documentations, the study for both baseline and follow-up assessments was approved on June 24, 2011.

Additionally, permission from facility authorities was taken prior to conducting each observation and the privacy of patients were ensured during the procedure. Prior to each interview, injection providers, supervisors of these providers, and facility waste handlers were read, and agreed to, an informed consent form. All participation was voluntary, and data collectors signed each informed consent form.

To ensure confidentiality, the results presented in this report are not linked to individual facilities or to the providers' names and locations.

DATA COLLECTION TOOL

An adaptation of the WHO Tool C-Revised was used to collect data. It was designed to determine the extent to which injections, lancet procedures, phlebotomies and IV injections and infusions were consistent with national safety standards (see Appendix 4).

The questionnaire is divided into eight parts, as follows:

- Section 1: Structured observations of the facility
- Section 2: Structured observations of injection practices
- Section 3: Structured observations of phlebotomies (blood collection), lancets, IV infusions, and IV injections
- Section 4: Structured observations of sterilization practices
- Section 5: Interview with providers
- Section 6: Interview with supervisors of injection providers
- Section 7: Structured observations of disposable injection equipment
- Section 8: Interview with waste handlers.

The adaptation included some revisions to the tool used for this survey. For example, the Tool C-Revised does not include a section for waste handler interviews, which was a necessary aspect of the evaluation; therefore, Section 8 based on the MMIS Health Facility Assessment (HFA) tool was included for the purposes of this assessment. At follow-up, more revisions to the tool were made. In Section 1, additional questions were added about the use of color coded bin liners for waste segregation and of protective equipment by waste handlers.

The administration of Sections 2 and 3 in the hospitals and lower-level facilities was also an amendment to the Tool C-Revised protocol. At hospitals, observations were made in separate departments or units that provided medical injections, whereas in lower-level facilities, observations were made in one area because all services are provided in the same space. Therefore, it was decided that every observed injection provider in each hospital unit as well as his or her supervisor would be interviewed (Section 5 and 6), while only one injection provider and supervisor was interviewed in the lower-level facilities. The result was a larger sample of injection, phlebotomy, lancet, IV infusion, and IV injection observations and of interviews of providers and their supervisors.

DATA COLLECTION

Baseline data was collected over a period of 14 days from March 4 through May 14, 2011, in all five states. Due to national elections and disruptions in service provision in Benue and Lagos, the data collection period was extended. Data were not collected in the Federal Capital Territory (FCT) because previous surveys had covered the area adequately. The follow-up was conducted just over one year later and data was collected from July 2-13, 2012. Data collectors and supervisors were trained to participate in collecting data from the health care facilities. A total of 26 data collectors and 4 supervisors were trained for five days. Training involved the review and finalization of the tool following pilot testing in four Abuja health facilities with characteristics similar to those to be surveyed. Following the baseline training, five teams were formed for the five states with a total of six team leaders (Bauchi State had 2 team leaders).

The team leaders were supervisors in the field. Each supervisor was placed in charge of a team to ensure the proper implementation of the survey. They provided daily updates to the State supervisors. These were leaders from the FMOH and the AIDSTAR-One Nigeria project who provided joint coordination. Each of these state supervisors was rotated during the two weeks of data collection for data quality purposes.

ORGANIZATION AND COORDINATION OF DATA ENTRY AND ANALYSIS

STATA and SPSS software were used to manage and analyze data. Ten operators with prior experience using the data entry software were required for data entry. After questionnaires were completed, the team supervisor reviewed and validated them prior to their being entered and analyzed.

The proportions of observations were calculated for each component of the form using either the number of health care facilities, individuals surveyed, or injections observed as denominators.

LIMITATIONS

The selection of facilities was based on a list of functional facilities verified by the Ministry of Health in the participating states. It was found, however, that some facilities were locked without explanation, so replacement facilities were used in these cases. During follow up, in Bauchi state, Tafawa Balewa LGA was replaced by Dass LGA for safety reasons. The replacement facilities were General Hospital Dass, DOT PHC, and Baraza PHC. In Benue state, three facilities (Adai HC, Obagaji HC, and Egwuma PHC) could not be assessed during the stipulated assessment time as their immunization days were at the end of the month. The only injections that can be observed in some of the rural health facilities are immunizations. During data collection in order to maximize time, the immunization days of these health facilities were targeted so that at the very least, immunizations would be observed. Since immunization days were towards the end of the month, they did not fall within the data collection period and were not included in the sample. One of the data collectors who was also the focal person for the state was however able to organize to have those facilities assessed at a later date. In Sokoto state, Kaura Buba Dispensary was replaced with Darhela Up-Graded Dispensary which was again replaced with PHC Dingyadi in Bodinga LGA, due to inability to track the providers and non-functional facilities. In addition, two facilities had to be assessed outside of the assessment period. Data collectors had to observe immunization practices,

and because immunization days could not be readily determined, they had to observe immunizations outside of the assessment period. The focal person who was also a data collector in the state was able to complete the outstanding facilities. A total of five facilities were replaced during sampling for the follow-up survey.

During follow-up, there were difficulties observing injections in some facilities due to non-availability of vaccines in some cases and irregularity of immunization days which resulted in several revisits to facilities. In addition, there were no telephone networks in some of the more remote health facilities, making them difficult to contact to find pertinent information concerning the facilities and to schedule visits. Some facilities required a variety of transport modes to reach them due to their distance, so it was easier to phone ahead and find out when immunization days were or when there was a patient on daily therapeutic injections. For health facilities where there was no phone service this became more difficult.

The rains made some facilities very difficult to access, including facilities in Agatu LGA of Benue. In addition, during the rainy season most people in the rural areas, where most of the PHCs are located, concentrate on farming; therefore health facilities are often underutilized during this period. This made it difficult for observations to be made as some of these facilities virtually closed down during the farming season. In addition, in some of the target LGAs, many patients were reported to have very limited cash during the few months before harvest, and so they visited the health facilities only when it was absolutely necessary. One facility in Agatu LGA, Aila PHC had been closed due to nonpayment of rent by the local government authorities and this was replaced with Egwuma PHC. However, despite all the challenges, the team visited and administered the survey in the other sampled facilities.

DESCRIPTION OF THE DATA COLLECTED AT BASELINE AND FOLLOW-UP

During both baseline and follow-up surveys, 80 health facilities were included in the assessments. The distribution of hospitals and lower level facilities were approximately the same for both surveys (Table 2). Table 3 displays the details on the planned and actual sample sizes for both baseline and follow-up surveys. Table 4 shows the distribution of injections observed.

Table 2. Type of Facilities

	Baseline	%	Endline	%
Hospital	20	25	21	26
Lower Level	60	75	59	74
Total	80		80	

Table 3. Sampling by Survey

	Planned	Baseline	Endline
Observations			
Health care facilities	80 facilities	80 facilities	80 facilities
Injection practices	320 observations	139 observations	148 observations
Phlebotomies, lancets, IV infusions, and IV injections	320 observations	99 observations	113 observations
Sterilization practices	80 facilities	21 facilities	3 facilities*
Disposable injection equipment	80 facilities	77 facilities	80 facilities
Interviews			
Injection providers	220 interviews	217 interviews	212 interviews
Supervisors of injection providers	220 interviews	189 interviews	188 interviews
Waste handlers	80 interviews	80 interviews	78 interviews

* At baseline, data collectors found that observations of sterilization practices were only necessary where dental services were offered. At follow-up, only those facilities with such services were targeted for these observations.

Table 4. Distribution of Observed Injections and Intravenous

		Baseline		Endline	
Injections		N	%	N	%
	Vaccinations	59	42.5	67	45.3
	Therapeutic	60	43.2	60	40.5
	FP	15	10.8	17	11.5
	Dental	5	3.6	4	2.7
	Total	139		148	
IV and blood draw					
	Phlebotomies	30	30.3	29	25.7
	Lancets	28	28.3	37	32.7
	IV injections	24	24.2	22	19.5
	IV infusions	17	17.2	25	22.1
	Total	99		113	

RESULTS

ASSESSMENT OF RISKS TO THE PATIENT

In this section, risks to the patient are examined by comparing procedures related to injections and IV infusions and blood draw between baseline and follow-up in 80 health facilities. Risk factors, including staff behavior and injection providers' handling of equipment, were assessed through facility observations, observation of practices, and interviews with providers and supervisors.

DISPOSAL OF USED SHARPS

Used sharps in a health facility pose a risk to both providers and patients who come in contact with them; therefore it is important to properly dispose of them inside a sharps container. Out of 80 health facilities, at follow-up 66.2 percent had no used sharps of any type lying around inside the facility compared to 73.8 percent of facilities at baseline. This includes needles, syringes, phlebotomy, and IV infusion equipment. However during follow-up, a lower proportion of health facilities (75 percent) had no loose disposable needles and syringes inside the facility compared to baseline (96.3 percent) and this difference was found to be significant as highlighted below in Table 5. In addition, 70 percent of facilities did not have loose disposable IV infusion equipment inside the facility compared to 64 percent during baseline. There was no evidence of attempted sterilization of disposable injection equipment at baseline or follow-up.

Table 5. Disposal of Used Sharps Inside Health Facilities

	Baseline			Endline			
	#	*N*	%	#	*n*	%	*P*
Health facilities with no used sharps lying around inside the facility	59	80	73.8	53	80	66.2	0.301
Health facilities without loose disposable needles and syringes inside facility	77	80	96.3	60	80	75.0	**0.000**
Health facilities without loose disposable phlebotomy equipment inside facility	36	36	100	38	39	97.4	0.333
Health facilities without loose disposable intravenous infusion equipment inside facility	38	59	64.4	38	54	70.4	0.500
Health facilities with no evidence of attempted sterilization of disposable injection equipment	80	80	100	80	80	100	NA

LOOSE INFECTIOUS WASTE

Seventy percent of the health facilities at follow-up had no non-sharps infectious waste outside an appropriate container compared to only 50 percent at baseline; this difference was found to be statistically significant. The majority of facilities (80 percent) also used color coded bin liners to make sure that waste was properly segregated (Table 6). At health facilities that did have non-sharps infectious waste outside of appropriate containers, data collectors mostly observed cotton wool, swabs, or dressings.

Table 6. Loose Infectious Waste

	Baseline			Endline			
	#	*n*	%	#	*n*	%	*p*
Health facilities with no non-sharps infectious waste outside an appropriate container	40	80	50.0	56	80	70.0	**0.01**
Health facilities with color coded bin liners*	-	-	-	64	80	80.0	

*Data was gathered only during endline.

HAND HYGIENE

Hand hygiene is one of the most effective means of infection prevention and control in health care settings. To ensure that health workers who provide direct or indirect patient care perform this vital practice, hand washing facilities must be available. At follow-up, 44 percent of health facilities had running water and soap for washing hands compared to 29 percent of facilities at baseline. Six out of 80 facilities also had alcohol-based hand rub, which was not available at any facility during baseline (Table 7). Both results were found to be significant.

Table 7. Availability of Hand washing Products at Health Facilities

	Baseline			Endline			
	#	*n*	%	#	*n*	%	*p*
Health facilities with running water and soap for washing hands	23	80	28.8	35	80	43.8	**0.048**
Health facilities with alcohol-based hand rub for cleansing hands	0	80	0.0	6	80	7.5	**0.013**

OBSERVATION OF VACCINATION, THERAPEUTIC, FAMILY PLANNING, AND DENTAL INJECTIONS

At follow-up, a total of 148 injection practice observations were collected from the 80 health facilities. Of these, 45.3 percent were vaccinations, 40.5 percent were therapeutic, 11.5 percent were family planning, and 2.7 percent were dental (Table 4).

PREPARATION OF INJECTIONS ON A CLEAN WORK TABLE OR TRAY

Data collectors observed hygienic conditions of injections, specifically whether the injection was prepared on a clean work table or tray to avoid contamination of the injection equipment with blood

and body fluids, dirty swabs, or other biological waste. Out of all injections observed, 77 percent were prepared on a clean surface at follow-up compared to only 44.6 percent of all injections at baseline (see Table 8).

Table 8. Preparation of Injections on Clean Work Table and Hand Hygiene at Health Facilities

		Baseline			Endline			
Preparation of injection on a clean work table or tray		**#**	***N***	**%**	**#**	***n***	**%**	***P***
	Vaccination	28	59	47.5	58	67	86.6	**0.000**
	Therapeutic	22	60	36.7	39	60	65.0	**0.002**
	Family Planning	7	15	46.7	14	17	82.4	**0.034**
	Dental	5	5	100	3	4	75.0	0.236
	Total	62	139	44.6	114	148	77.0	**0.000**
Provider washed hands with soap and water before preparation								
	Vaccination	7	59	11.9	20	67	29.9	**0.014**
	Therapeutic	5	59	8.5	13	60	21.7	**0.045**
	Family Planning	4	15	26.7	5	17	29.4	0.863
	Dental	2	5	40.0	1	4	25.0	0.635
	Total	18	138	13.0	39	148	26.4	**0.005**

HAND HYGIENE BEFORE VACCINATION, THERAPEUTIC, AND FAMILY PLANNING INJECTIONS

Data collectors also gathered information on injection providers' hand washing practices to examine general hygienic conditions. Providers were asked whether they washed their hands with soap and running water or cleansed using alcohol-based hand rub prior to the preparation of an injection. Results showed that injection providers practiced proper hand hygiene in very few cases. None of the providers used an alcohol-based hand rub at baseline or follow-up. And although injection providers washed their hands in double the proportion of cases during follow-up compared to baseline, this was done in only 26.4 percent of the cases at follow-up (Table 8).

CLEANING PATIENTS' SKIN BEFORE THE INJECTION

Data collectors also observed whether patient's skin was cleaned prior to the injection. The WHO recommends that it is only necessary to clean skin if it is visibly dirty. At follow-up, 49.3 percent of injection providers prepared patients' skin correctly prior to an injection utilizing water or a clean swab, no preparation for visibly clean skin, or antiseptic for family planning or therapeutic injections compared to a total of 66.9 percent of providers who utilized the correct practice at baseline (Table 9).

Data collectors also noted that at follow-up six providers incorrectly used antiseptic to clean the skin prior to vaccination, which could compromise the efficacy of the vaccine.

Table 9. Cleaning of Patient's Skin*

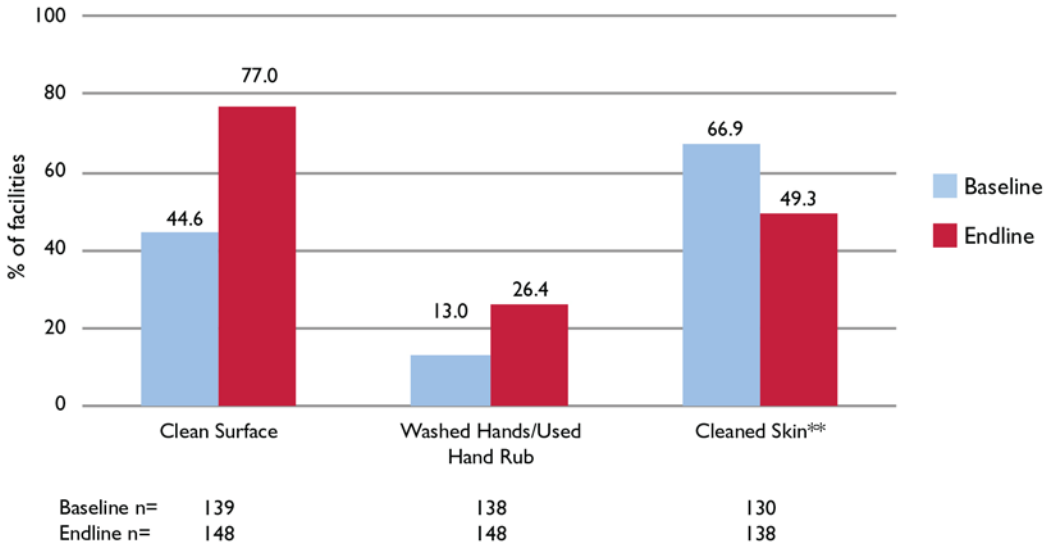
		Baseline		Endline		
		#	%	#	%	P
Vaccination	(n=59)			(n=67)		
	Water or clean, wet swab	21	36.2	13	20.0	0.409
	Antiseptic	4	6.9	6	9.2	
	Dry cotton	7	12.1	9	13.8	
	Dirty swab	12	20.7	16	24.6	
	Skin not cleaned and it is clean	12	20.7	15	23.1	
	Skin not cleaned and it is dirty	2	3.4	6	9.2	
	Total	58	100	65	100	
Therapeutic	(n=60)			(n=60)		
	Water or clean, wet swab	14	23.7	8	13.8	0.134
	Antiseptic	24	40.7	17	29.3	
	Dry cotton	9	15.3	7	12.1	
	Dirty swab	6	10.2	15	25.9	
	Skin not cleaned and it is clean	3	5.1	5	8.6	
	Skin not cleaned and it is dirty	3	5.1	6	10.3	
	Total	59	100	58	100	
Family Planning	(n=15)			(n=17)		
	Water or clean, wet swab	3	23.1	1	6.7	0.311
	Antiseptic	9	69.2	8	53.3	
	Dry cotton	-	-	1	6.7	
	Dirty swab	-	-	2	13.3	
	Skin not cleaned and it is clean	1	7.7	1	6.7	
	Skin not cleaned and it is dirty	-	-	2	13.3	
	Total	13	100.0	15	100	
All procedures	(n=134)			(n=144)		
	Water or clean, wet swab	38	29.2	22	15.9	0.016
	Antiseptic	37	28.5	31	22.5	
	Dry cotton	16	12.3	17	12.3	
	Dirty swab	18	13.8	33	23.9	
	Skin not cleaned and it is	16	12.3	21	15.2	

		Baseline		Endline		
		#	%	#	%	P
	clean					
	Skin not cleaned and it is dirty	5	3.8	14	10.1	
	Total	130	100.0	138	100.0	

*Note: Observations were not made in four cases at baseline and six cases at endline.

Overall there were fewer injections observed at follow-up where the patient's skin was cleaned in an appropriate manner compared to baseline (Figure 1).

Figure 1. Summary of the Observations Related to Infection Prevention and Control*



**"Cleaned skin" includes observations that use water or a clean wet swab for vaccination and use antiseptic for therapeutic or family planning injections as well as providers who did not clean skin that was not visibly dirty.

**Differences between baseline and endline are all statistically significant ($p<0.05$).

TYPES OF SYRINGE USED

The types of syringes used for various procedures were examined. For vaccinations, most providers used safety syringes (auto-disable[3] and retractable syringes) at both baseline and follow-up (79.7 percent and 92.5 percent, respectively). For therapeutic injections, 91.7 percent of providers used standard disposable syringes at follow-up, an increase from 78.3 percent at baseline. For family planning injections, most providers used standard disposable syringes at baseline (80 percent); however, at follow-up this proportion decreased to less than half (41.2 percent) because providers used more auto-disable syringes (Table 10).

Table 10. Syringe Type Used

		Baseline		Endline		
		#	%	#	%	*P*
Vaccination	(n=59)			(n=67)		**0.05**
	Standard disposable	12	20.3	5	7.4	
	Auto-disable	47	79.7	60	89.6	
	Retractable	-	-	2	3.0	
	Other safety syringe	-	-	-	-	
	Sterilizable	-	-	-	-	
	Disposable	-	-	-	-	
	Total	59	100	67	100	
Therapeutic	(n=60)			(n=60)		**0.041**
	Standard disposable	47	78.3	55	91.7	
	Auto-disable	13	21.7	5	8.3	
	Retractable	-	-	-	-	
	Other safety syringe	-	-	-	-	
	Sterilizable	-	-	-	-	
	Disposable	-	-	-	-	
	Total	60	100	60	100.0	
Family Planning	(n=15)			(n=17)		**0.026**
	Standard disposable	12	80.0	7	41.2	
	Auto-disable	3	20.0	10	58.8	
	Retractable	-	-	-	-	
	Other safety syringe	-	-	-	-	
	Sterilizable	-	-	-	-	
	Disposable	-	-	-	-	
	Total	15	100	17	100	
Dental	(n=5)			(n=4)		0.175
	Standard disposable	-	-	2	50	

[3]A syringe designed to prevent reuse by locking or disabling after giving a single injection (as defined by WHO).

		Baseline		Endline		
		#	%	#	%	P
	Auto-disable	1	20	-	-	
	Retractable	-	-	-	-	
	Other safety syringe	-	-	-	-	
	Sterilizable	2	40	2	50	
	Disposable	2	40	-	-	
	Total	5	100	4	100	
All procedures	(n=139)			(n=148)		0.328
	Standard disposable	71	51	69	46.6	
	Auto-disable	64	46	75	50.7	
	Retractable	0	0	2	1.4	
	Other safety syringe	0	0	0	0.0	
	Sterilizable	2	1	2	1.4	
	Disposable	2	1	0	0.0	
	Total	139	100	148	100	

There were 10.1 percent of cases at baseline where patients brought their injection equipment to the facility. At follow-up this proportion decreased to only 5.5 percent of cases, which included 8 patients who brought them for therapeutic procedures (Table 11). Providers confirmed this during their interviews when asked about how often patients brought their injection equipment to the facility. Four providers (1.9 percent) answered "always" and 13 providers (6.1 percent) said "sometimes." More providers at follow-up (57.5 percent) reported being aware of needles and syringes for sale outside their facility compared to baseline (48.4 percent).

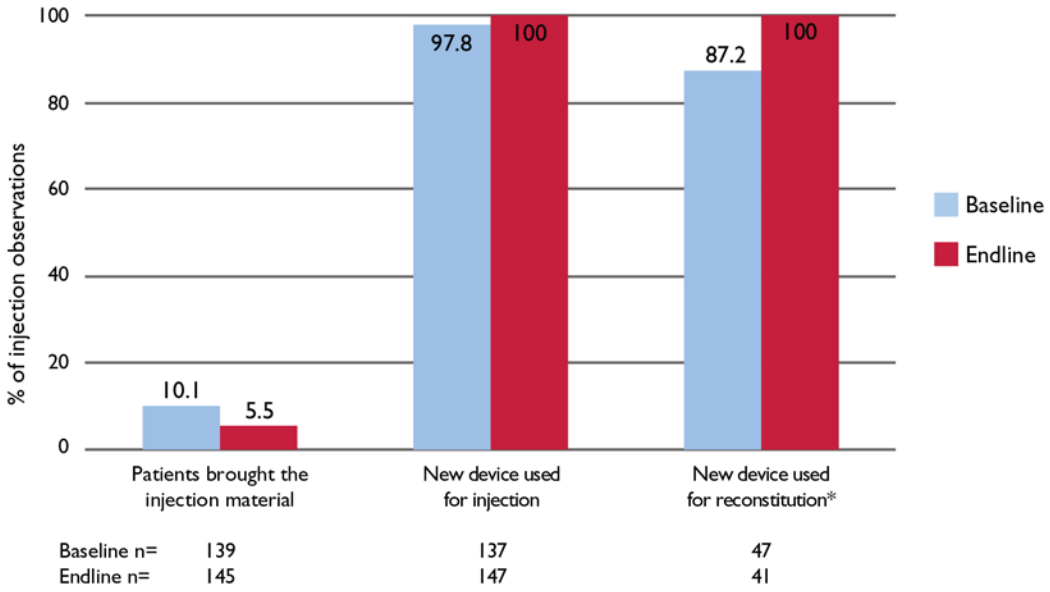
Table 11. Sources of New Needles and Syringes

	Baseline			Endline			
Patients brought the injection material	#	*n*	%	#	*n*	%	*P*
Vaccination	1	59	1.7	0	65	0.0	0.292
Therapeutic	12	60	20.0	8	59	13.6	0.347
Family Planning	1	15	6.7	0	17	0.0	0.279
Dental	-	5	-	-	4	-	NA
Total	14	139	10.1	8	145	5.5	0.151

USE OF NEW NEEDLES AND SYRINGES FOR INJECTIONS AND TO RECONSTITUTE MEDICATIONS

At baseline, almost all of the needles and syringes used for injections were taken from sterile unopened packets or fitted with caps. At follow-up, all of the needles and syringes used in the143 injection observations were sterile and new (Figure 2).

Figure 2. Sources and Practices of Using New Needles and Syringes



*Difference between baseline and endline are all statistically significant (p<0.05). There were 47 reconstituted injections at baseline and 41 at follow-up.

Similarly for reconstituted medications, all injections that were observed were sterile and new at follow-up compared to 87.2 percent at baseline. Figure 2 displays the sources of injection materials used for procedures and the extent to which baseline and follow-up surveys differ.

DILUENT FOR RECONSTITUTION

To maintain the effectiveness and safety of injections, it is recommended to use diluents from the same manufacturer for preparation. At baseline, data collectors noted that diluent from the same manufacturer of the vaccine was used in all 31 reconstituted vaccinations and 10 of the 11 reconstituted therapeutic injections observed. It was used to a similar extent at follow-up, with 38 out of 39 reconstituted vaccinations and 1 out of 2 reconstituted therapeutic injections observed. Of the two family planning injections at follow-up, none used diluent from the same manufacturer.

At baseline, appropriate diluents were used during all observations in hospitals and in 96.7 percent of lower-level facilities; whereas during follow-up, it was used in only 87.5 percent of hospitals and 91.4 percent of lower-level facilities.

MULTI-DOSE VIALS

To prevent contamination of injectable medications, multi-dose vials must be properly cared for by cleaning the rubber cap. At baseline, providers cleaned the rubber cap of the vial with antiseptic before inserting a needle into the vial in 16.9 percent of observations. At follow-up, in no observations was the rubber cap correctly cleaned with antiseptic with a multi-dose vial, however, in 3.2 percent of vaccination injections antiseptic was used which can compromise the vaccine. However, this is an improvement over baseline when 10.7 percent of vaccines were cleaned incorrectly with antiseptic. Of the therapeutic and dental injections observed, none of the providers cleaned the cap of the multi-dose vials with antiseptic. There was, however, a significant decrease in the use of dirty swabs from 6.7 percent at baseline to none at follow-up.

Needles should never be left in the rubber cap of a multi-dose vial or else this opens the vial to contamination. All providers removed the needle from the rubber cap after withdrawing the dose in all of the injections that used a multi-dose vial for vaccination, therapeutic, and dental procedures at follow-up. This was an increase compared to 82.5 percent of vaccinations, 52.9 percent of therapeutic injections, and both dental injections at baseline (Table 12).

Table 12. Use of Multi-Dose Vials

		Baseline			Endline			
Cap of multi-dose vial cleaned with antiseptic		**#**	***n***	**%**	**#**	***N***	**%**	***P***
	Therapeutic	5	18	27.8	-	10	-	0.066
	Family Planning	-	-	-	-	-	-	-
	Dental	2	3	66.7	-	2	-	0.136
	Total	13	77	16.9	-	74	0	**0.000**
Cap of multi-dose vial cleaned with a dirty swab								
	Vaccination	4	56	7.1	-	62	-	**0.032**
	Therapeutic	0	16	0.0	-	10	-	NA
	Family Planning	-	-	-	-	-	-	-
	Dental	1	3	33.3	-	2	-	0.361
	Total	5	75	6.7	-	74	-	**0.024**
Needle removed from rubber cap of multi-dose vial								
	Vaccination	47	57	82.5	62	62	100	**0.001**
	Therapeutic	9	17	52.9	9	9	100	**0.013**
	Family Planning	-	-	-	-	-	-	0.863
	Dental	2	2	100	2	2	100	NA
	Total	58	76	76.3	73	73	100	**0.000**

USE OF CLEAN BARRIERS TO PROTECT FINGERS WHEN BREAKING GLASS AMPOULES

Opening and breaking glass vials can pose a risk to injections providers and lead to contamination of the injectable medication or equipment. It was therefore examined whether providers used a barrier to protect their fingers when breaking glass ampoules. At follow-up data collectors observed that there were significantly more providers (38.9 percent) using clean barriers compared to baseline (13.6 percent), although it was still only observed in fewer than half of the injections.

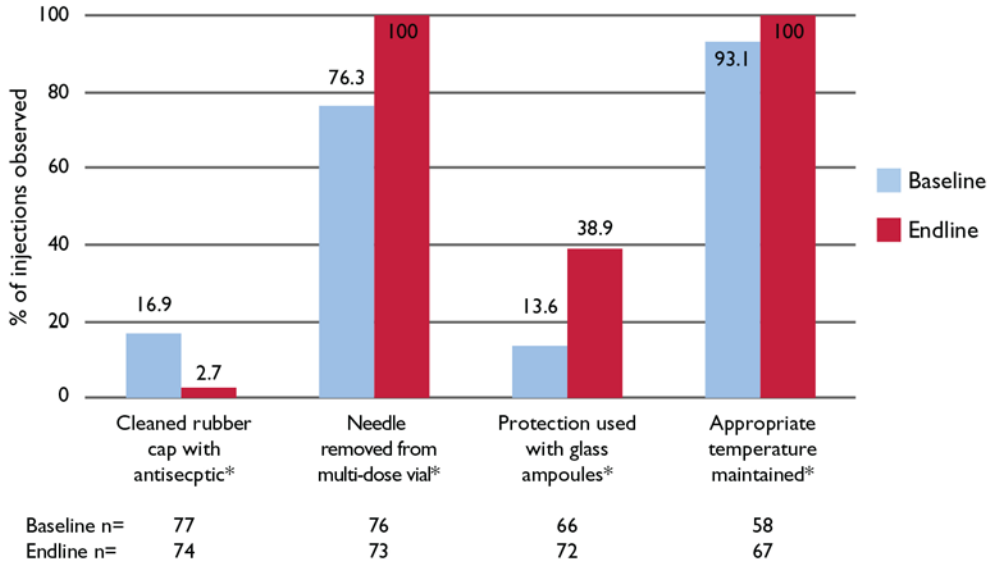
Table 13. Use of Clean Barriers to Protect Fingers When Breaking Glass Ampoules

		Baseline			Endline			
		#	*n*	%	#	*n*	%	*P*
	Vaccination	1	11	9.1	3	4	75.0	**0.011**
	Therapeutic	4	43	9.3	18	51	35.3	**0.003**
	Family Planning	3	11	27.3	7	16	43.8	0.384
	Dental	1	1	100.0	0	1	0.0	0.157
	Total	9	66	13.6	28	72	38.9	**0.001**

STORAGE TEMPERATURE FOR HEAT-SENSITIVE MEDICATION AND VACCINES

Data was collected on whether heat-sensitive vaccines and medications were kept at a specific range of temperatures. Vaccination injections were maintained at appropriate temperatures between 2 and 8 degrees Celsius in 93.1 percent of the 58 vaccinations at baseline and all 67 vaccinations at follow-up (Figure 3).

Figure 3. Protecting Injectable Medications from Contamination or Deterioration



*Differences between baseline and endline are all statistically significant ($p<0.05$).

OBSERVATIONS OF PHLEBOTOMIES, LANCET PROCEDURES, INTRAVENOUS INFUSIONS, AND INTRAVENOUS INJECTIONS

At both baseline and follow-up, providers mainly used standard disposable needles and syringes for phlebotomy procedures and IV injections, although there was an increase in the use of vacuum tubes, holders and adapters for phlebotomies. Lancets were primarily used for procedures requiring lancing. For IV infusions, most providers used winged collection sets at baseline and standard disposable needle and syringes at follow-up. Data collectors rarely observed providers using safety devices such as auto-disable and retractable syringes (Table 14).

Table 14. Device Type Used

		Baseline		Endline		
		#	%	#	%	*P*
Phlebotomy	(n=30)			(n=29)		**0.054**
	Holder/adapter and vacuum tubes	4	13.3	10	34.5	
	Standard disposable needle and syringe	21	70.0	19	65.5	
	Auto-disable syringe	4	13.3	-	-	
	Retractable syringe	-	-	-	-	
	Winged collection set	1	3.3	-	-	
	Lancet	-	-	-	-	
	Sterilizable needle or syringe	-	-	-	-	
	Total	30	100	29	100	
Lancet	(n=28)			(n=37)		0.441
	Holder/adapter and vacuum tubes	-	-	-	-	
	Standard disposable needle and syringe	5	17.9	5	13.5	
	Auto-disable syringe	1	3.6	-	-	
	Retractable syringe	-	-	-	-	
	Winged collection set	-	-	-	-	
	Lancet	22	78.6	32	86.5	
	Sterilizable needle or syringe	-	-	-	-	
	Total	28	100	37	100	
Intravenous Injection	(n=24)			(n=22)		0.096
	Holder/adapter and vacuum tubes	-	-	-	-	
	Standard disposable needle and syringe	14	58.3	19	86.4	
	Auto-disable syringe	5	20.8	1	4.5	
	Retractable syringe	3	12.5	-	-	
	Winged collection set	2	8.3	2	9.1	
	Lancet	-	-	-	-	
	Sterilizable need or syringe	-	-		-	
	Total	24	100	22	100	
Intravenous Infusion*	(n=17)			(n=25)		**0.003**
	Holder/adapter and vacuum tubes	-	-	-	-	

		Baseline		Endline		
		#	%	#	%	*P*
	Standard disposable needle and syringe	6	37.5	22	88.0	
	Auto-disable syringe	1	6.3	-	-	
	Retractable syringe	-	-	-	-	
	Winged collection set	9	56.3	3	12.0	
	Lancet	-	-	-	-	
	Sterilizable need or syringe	-	-		-	
	Total	16	100	25	100	
All procedures	(n=99)			(n=113)		**0.000**
	Holder/adapter and vacuum tubes	4	4.1	10	8.8	
	Standard disposable needle and syringe	46	46.9	65	57.5	
	Auto-disable syringe	11	11.2	1	0.9	
	Retractable syringe	3	3.1	-	-	
	Winged collection set	12	12.2	5	4.4	
	Lancet	22	22.4	32	28.3	
	Sterilizable need or syringe	-	-	-	-	
	Total	98	100	113	100	

*Observations were not made in one case at baseline.

HAND HYGIENE BEFORE BLOOD DRAWS AND INTRAVENOUS PROCEDURES

Proper hand hygiene was observed in approximately 25 percent of all observations at follow-up compared to only 2 percent at baseline. Data collectors observed that providers washing their hands with soap and running water significantly improved from baseline; however, this practice was only observed in 25 percent of the 113 observations at follow-up. The majority of these were observed in hospitals (72 percent) compared to baseline where the only two cases where providers washed their hands with soap and running water were observed in lower-level facilities. Providers were observed cleansing their hands with alcohol-based hand sanitizer in three lancet procedures, whereas at baseline none of the providers used this practice (Table 15).

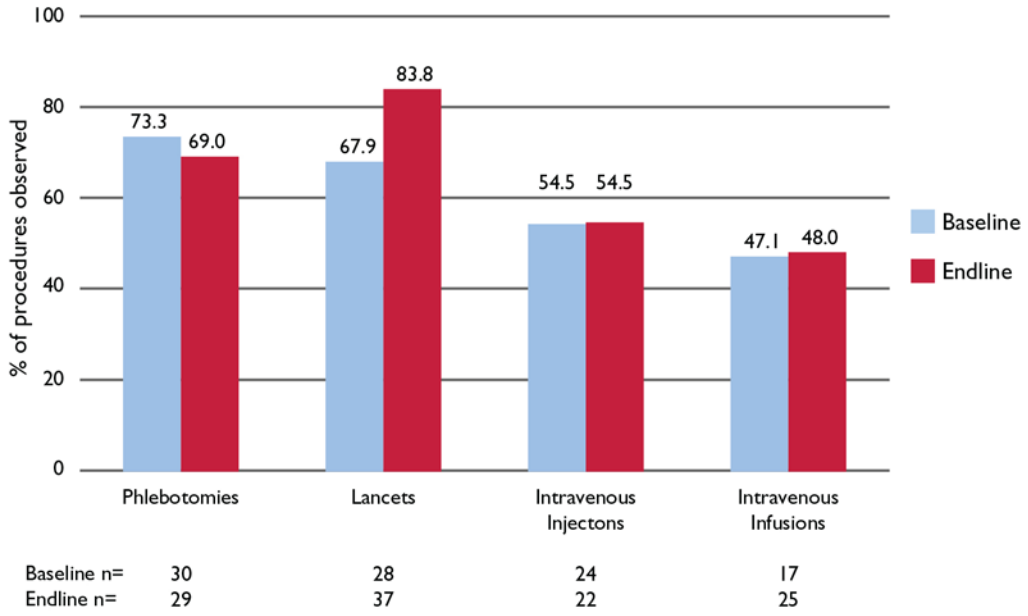
Table 15. Hand Hygiene before Blood Draws and Intravenous Procedures

		Baseline			Endline			
Washed hands with soap and running water		**#**	***n***	**%**	**#**	***n***	**%**	***P***
	Phlebotomies	1	30	3.3	7	29	24.1	**0.02**
	Lancets	-	28	-	10	37	27.0	**0.003**
	IV Injections	1	24	4.2	4	22	18.2	0.127
	IV Infusions	-	17	-	4	25	16.0	0.083
	Total	2	99	2.0	25	113	22.1	**0.000**
Cleansed hands with alcohol-based hand sanitizer								
	Phlebotomies	-	30	-	-	22	-	NA
	Lancets	-	28	-	3	27	11.1	0.07
	IV Injections	-	23	-	-	18	-	NA
	IV Infusions	-	17	-	-	21	-	NA
	Total	-	98	-	3	88	3.4	0.07
Cleansed hands with soap and water or alcohol-based hand sanitizer								
	Phlebotomies	1	30	3.3	7	29	24.1	**0.02**
	Lancets	-	28	-	13	37	35.1	**0.000**
	IV Injections	1	24	4.2	4	22	18.2	0.127
	IVs Infusions	-	17	-	4	25	16.0	0.083
	Total	2	99	2.0	28	113	24.8	**0.000**

PREPARATION ON A CLEAN WORK TABLE OR TRAY

Similar proportions of procedures were prepared on a clean work table or tray at baseline (62.6 percent) and follow-up (66.4 percent). This practice reduces the risk of contaminating the equipment with blood, body fluids, or dirty swabs. It occurred more frequently for phlebotomy and lancet procedures compared to IV injections and infusions (Figure 4).

Figure 4. Procedures Prepared on a Clean Work Table or Tray*



*Differences between baseline and endline were not found to be statistically significant.

CLEANING PATIENTS' SKIN BEFORE THE PROCEDURE

For phlebotomies and IV injections and infusions, the skin needs to be cleaned with antiseptic solution to ensure best practices and aseptic procedures. For lancet procedures, antiseptic, water, or no cleaning of visibly clean skin are all appropriate methods.

Providers used correct methods to clean the patient's skin prior to the **procedures** in over half of all procedures observed (60.6 percent at baseline and 65.5 percent at follow-up). At follow-up, there were more occasions at follow-up where dirty swabs were used in all procedures compared to baseline (15.4 percent and 3.3 percent, respectively) (Table 16). Providers used dirty swabs more frequently in IV infusions, where data collectors observed it in 6 out of 24 cases.

After preparing the skin with an antiseptic, assessing the vein by palpation increases the chance of a successful venipuncture. Antiseptic was used in 56.6 percent of the 76 IV procedures observed (phlebotomies, injections, and infusions). Of these, providers of 6 out of 19 phlebotomies, 5 out of 11 IV injections, and 5 out of 13 IV infusions palpated the venipuncture site. Palpation after antiseptic use was observed in 37.2 percent of cases at follow-up compared to 40.5 percent at baseline. This difference was not found to be statistically significant (p=0.76).

Table 16. Patient's Skin Cleaned*

		Baseline		Endline		
Patient's Skin Cleaned		**#**	**%**	**#**	**%**	***P***
Phlebotomies		(N=30)		(n=29)		0.133
	Water or clean, wet swab	4	13.3	1	3.4	
	Antiseptic	19	63.3	19	65.5	
	Dry cotton	5	16.7	1	3.4	
	Dirty swab	1	3.3	5	17.2	
	Skin not cleaned and it is clean	1	3.3	2	6.9	
	Skin not cleaned and it is dirty	-	-	1	3.4	
	Total	30	100	29	100	
Lancets	(n=28)			(n=37)		0.505
	Water or clean, wet swab	3	10.7	3	8.1	
	Antiseptic	20	71.4	27	73.0	
	Dry cotton	4	14.3	2	5.4	
	Dirty swab	1	3.6	4	10.8	
	Skin not cleaned and it is clean	-	-	1	2.7	
	Skin not cleaned and it is dirty	-	-	-	-	
	Total	28	100	37	100	
Intravenous Injections	(n=24)			(n=22)		0.225
	Water or clean, wet swab	2	11.1	-	-	
	Antiseptic	11	61.1	11	78.6	
	Dry cotton	3	16.7	0	0.0	
	Dirty swab	-	-	1	7.1	
	Skin not cleaned and it is clean	1	5.6	-	-	
	Skin not cleaned and it is dirty	1	5.6	2	14.3	
	Total	18	100	14	100	
Intravenous Infusions	(n=17)			(n=25)		0.263
	Water or clean, wet swab	2	14.3	-	-	
	Antiseptic	7	50.0	13	54.2	
	Dry cotton	3	21.4	4	16.7	
	Dirty swab	1	7.1	6	25.0	
	Skin not cleaned and it is clean	-	-	-	-	
	Skin not cleaned and it is dirty	1	7.1	1	4.2	
	Total	14	100	24	100	
All procedures	(n=99)			(n=113)		**0.006**

		Baseline		Endline		
Patient's Skin Cleaned		**#**	**%**	**#**	**%**	***P***
	Water or clean, wet swab	11	12.2	4	3.8	
	Antiseptic	57	63.3	70	67.3	
	Dry cotton	15	16.7	7	6.7	
	Dirty swab	3	3.3	16	15.4	
	Skin not cleaned and it is clean	2	2.2	3	2.9	
	Skin not cleaned and it is dirty	2	2.2	4	3.8	
	Total	90	100	104	100	

* Observations were not made in nine cases at baseline and in nine cases at endline.

USE OF NEW DEVICES

At follow-up all eight phlebotomies where a holder/adapter was used did not have blood on it before it was used to perform the procedure. For each of the other procedures, all devices were taken from a sterile, unopened packet or fitted with two caps.

PROCEDURES FOR INTRAVENOUS INFUSIONS AND INJECTIONS

Patients shared a bed or stretcher with another patient in 2 out of 46 IV procedures at follow-up compared to 4 out of 39 at baseline. None of the patients with an existing IV catheter site (12 infusion and 14 injection patients) at baseline had dressings that were visibly soiled. But at follow-up where 3 infusion and 21 injection patients had existing IV catheter sites, dressings of 4 injection patients (19 percent) showed visible soiling, a statistically significant difference (see Table 17).

Among the 23 IV procedures that used an IV system with a needle and syringe at follow-up, the IV system was accessed from an IV port in 13 out of 20 injections and 2 out of 3 infusion procedures. The port was cleaned with chlorhexidine gluconate 2 percent, povidone-iodine, or alcohol prior to access only in 2 of the 20 intravenous injections and 1 of the 8 infusions. This result is similar to observations at baseline, which showed that the port was cleaned in only 3 out of 20 IV procedures that accessed the IV system from an IV port during the procedure.

IV solutions were taken from a glass bottle in some procedures (13 procedures at baseline and 4 at follow-up). Very rarely did providers clean the rubber stopper on the bottle top with an alcohol pad before inserting the spike through the stopper during baseline (3 at baseline and none at follow-up) (Table 17).

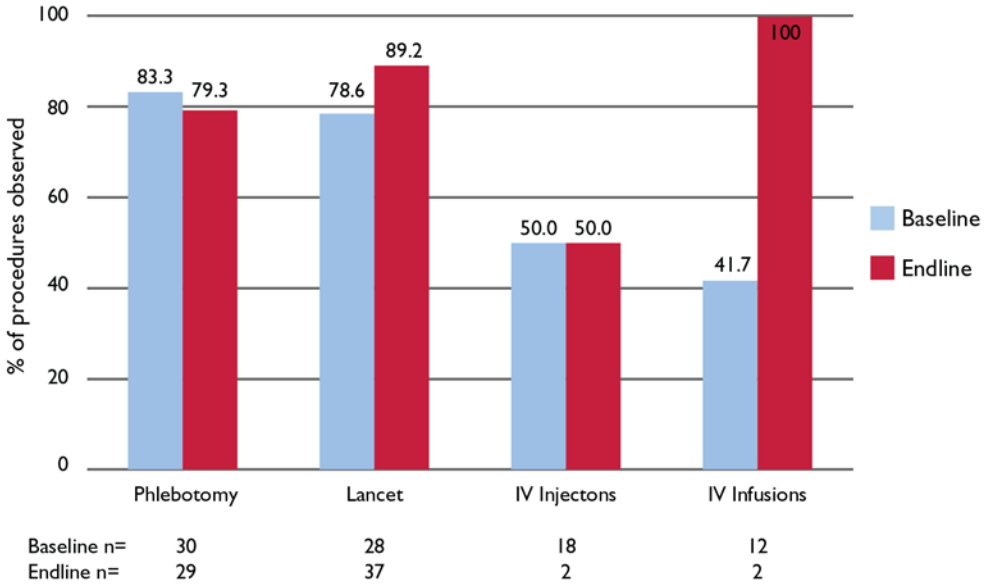
Table 17. Procedures for Intravenous Infusions and Injections

		Baseline			Endline			
IV patient did not share a bed or stretcher with another patient		**#**	***N***	**%**	**#**	***n***	**%**	***P***
	IV Injection	21	22	95.5	20	21	95.2	0.963
	IV Infusion	14	17	82.4	24	25	96.0	0.139
	Total	35	39	89.7	44	46	95.7	0.289
No existing catheter-site dressing was visibly soiled								
	Phlebotomy	1	1	100.0	-	-	-	NA
	Lancet	-	-	-	-	-	-	NA
	IV Injection	14	14	100.0	17	21	81.0	0.083
	IV Infusion	12	12	100.0	3	3	100	NA
	Total	27	27	100.0	20	24	83.3	**0.027**
IV system that used a needle/syringe where the IV system was accessed from an IV port								
	Phlebotomy	-	-	-	-	-	-	NA
	IV Injection	10	14	71.4	13	20	65.0	0.693
	IV Infusion	7	9	77.8	2	3	66.7	0.7
	Total	17	23	73.9	15	23	65.2	0.522
Injection ports were cleaned with CHG 2%, povidone-iodine or alcohol before accessing the IV system								
	Phlebotomy	2	4	50.0	-	-	-	NA
	IV Injection	2	14	14.3	2	20	10.0	0.703
	IV Infusion	1	6	16.7	1	8	12.5	0.825
	Total	5	24	20.8	3	28	10.7	0.027
Provider cleaned rubber stopper with an alcohol pad before inserting the spike in procedures with IV solution in a glass bottle								
	IV Injection	2	7	28.6	-	-	-	-
	IV Infusion	1	6	16.7	-	4	-	0.389
	Total	3	13	23.1	-	4	-	0.29

APPLICATION OF PRESSURE AFTER THE PROCEDURE

At follow-up, providers used a clean gauze pad and gently applied pressure to the puncture site to stop bleeding in a significantly higher percentage of procedures observed (84.3 percent) compared to baseline (69.3) (Figure 5). This includes 23 phlebotomies, 37 lancets, 1 IV injection, and 2 IV infusions. There were two cases where a hematoma developed, and providers terminated the procedure for both and applied pressure to the hematoma to prevent its expansion.

Figure 5. Pressure After the Procedure



Note:
Observations were not made in 11 cases at baseline and in 43 cases at endline.

CLEANING AFTER THE PROCEDURE

At follow-up, 35.4 percent of providers cleansed their hands with soap or water or used an alcohol-based hand rub after the observed procedure, a statistically significant improvement compared to baseline. Thirty-three cases at follow-up had blood or body fluid contamination in the work area, and in half of these cases the work area was cleaned with disinfectant. At baseline, this was done in only 20 percent of the observations, a statistically significant difference.

Table 18. Cleaning After the Procedure

		Baseline			Endline			
Observations in which the provider cleansed his or her hands after the procedure with soap and clean water or with an alcohol-based hand rub*		*#*	*n*	*%*	*#*	*n*	*%*	*P*
	Phlebotomy	3	30	10.0	7	29	24.1	0.148
	Lancet	2	27	7.4	14	37	37.8	**0.005**
	IV Injection	3	23	13.0	8	22	36.4	**0.069**
	IV Infusion	2	15	13.3	11	25	44.0	**0.045**
	Total	10	95	10.5	40	113	35.4	**0.000**
For cases with a contaminated work area, observations in which the provider cleansed with disinfectant								
	Phlebotomy	2	11	18.2	6	8	75.0	**0.013**
	Lancet	2	11	18.2	4	8	50.0	0.141
	IV Injection	2	8	25.0	2	7	28.6	0.876
	IV Infusion	1	5	20.0	5	10	50.0	0.264
	Total	7	35	20.0	17	33	51.5	**0.000**

*Observations were not made in four cases at baseline.

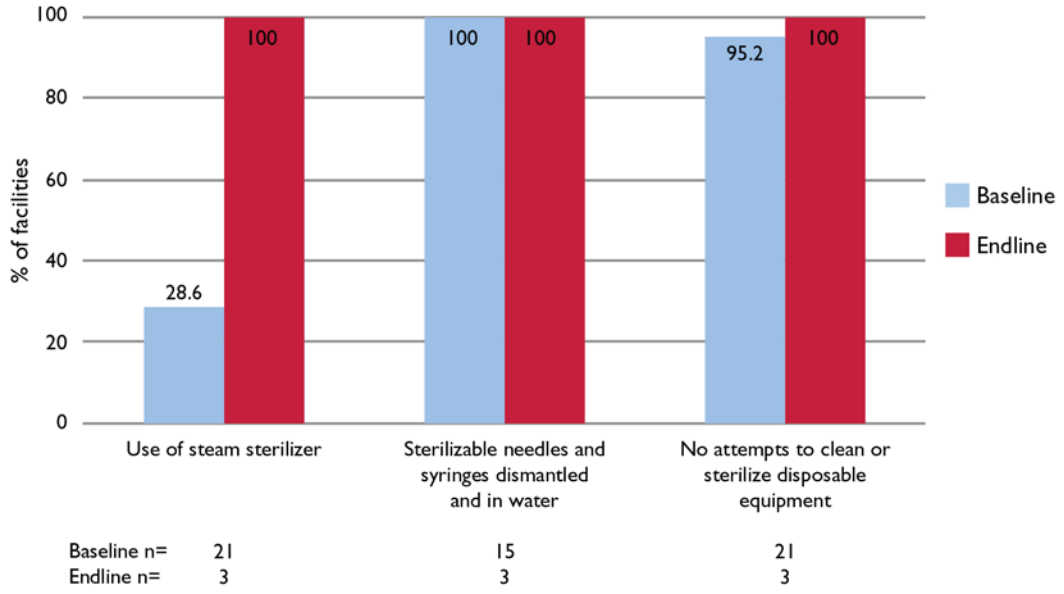
STERILIZATION PRACTICES

At follow-up, only three health facilities were using sterilization practices. All three facilities used steam to sterilize their devices for injections, venous phlebotomies, or IV procedures, compared to 6 out of 21 facilities at baseline. All facilities also had intact seals on the steam sterilizers and two had updated TST (temperature, steam, time) spot registers for at least one sterilizer. The one facility with no updated TST showed no evidence of a steam leak when data collectors asked for a sterilization to be performed.

None of the three follow-up health facilities showed evidence to indicate that boiling or another cleansing method was used instead of sterilization. All three facilities also did not show evidence of attempts to clean or sterilize disposable devices. In addition data collectors observed that all facilities had sterilizable needles and syringes either in a sterilizer, in use, or dismantled and immersed in water (Figure 6).

Of the three out of 188 supervisors who reported use of sterilizable syringes and needles at follow-up, one said that fuel or power to run the sterilizer was always available. The remaining two reported that fuel had been unavailable for less than one month at some point in the last six months.

Figure 6. Sterilization Practices



SUPPLY LEVELS OF DISPOSABLE EQUIPMENT

The stock levels of disposable equipment for the different procedures were assessed. Supervisors were asked how many procedures of the different types were done per week in their department or facility, and data collectors would then compare these responses with the number of devices available and in stock at the procedure site to see if there was enough stock for at least two weeks. More facilities at follow-up had enough equipment in stock for all procedures compared to baseline (Table 19). For each type of procedure, the majority of the facilities at follow-up had the necessary equipment in stock for at least two weeks. The number of health facilities with enough auto-disable injection equipment and enough disposable phlebotomy equipment for at least two weeks both showed a statistically significant improvement compared to baseline.

Table 19. Supply Levels of Disposable Equipment

	Baseline			Endline			
	#	*n*	%	#	*n*	%	*P*
Health facilities with enough **auto-disable injection equipment** for at least two weeks	48	64	75.0	65	67	97.0	**0.000**
Health facilities with enough **disposable and safety syringes** for at least two weeks	49	72	68.1	59	75	78.7	0.145
Health facilities with enough **disposable phlebotomy equipment** for at least two weeks	21	33	63.6	29	33	87.9	**0.022**

	Baseline			Endline			
	#	*n*	%	#	*n*	%	*P*
Health facilities with enough **lancets** for at least two weeks	22	33	66.7	31	39	79.5	0.219
Health facilities with enough **disposable intravenous cannula** for at least two weeks	19	36	52.8	28	40	70.0	0.123
Health facilities with enough **intravenous sets** for at least two weeks	22	37	59.5	29	39	74.4	0.167

FACILITIES USING STERILIZABLE EQUIPMENT

Of the 212 injection providers interviewed at follow-up, 1.4 percent reported using sterilizable equipment to administer injections compared to 3.7 percent at baseline. None of the providers reported use of sterilizable equipment for phlebotomies or IV procedures (Table 20). However, sterilizable equipment is generally only in use at dental clinics and not used for phlebotomies or IV procedures.

Table 20. Use of Sterilizable Equipment

	Baseline			Endline			
	#	*n*	%	#	*n*	%	*P*
Providers who reported use of sterilizable needles and syringes to administer injections	8	217	3.7	3	211	1.4	0.149
Providers who reported use of sterilizable needles and syringes for phlebotomies	2	217	0.9	-	212	-	**0.003**
Providers who reported use of sterilizable equipment for intravenous injections or infusions	4	217	1.8	-	212	-	**0.002**

STOCKOUTS OF SHARPS EQUIPMENT AND SHARPS CONTAINERS

Of all supervisors interviewed at follow-up, over 85 percent reported that they had no stockouts of injection equipment for any of the procedures during the previous six months. Across all types of injection equipment, fewer stockouts were reported at follow-up compared to baseline (Table 21). Statistically significant improvements were seen for supervisors who reported no stockouts of any disposable phlebotomy equipment and no stockouts of puncture-resistant sharps containers in the last six months.

Table 21. Stockouts of Disposable Equipment and Sharps Containers

	Baseline			Endline			
	#	*n*	%	#	*n*	%	*P*
Supervisors who reported no stockouts of any **disposable injection equipment** or safety syringes	134	170	78.8	126	145	86.9	0.081
Supervisors who reported no stockouts of any **disposable phlebotomy equipment** in the last six months	29	41	70.7	29	33	87.9	**0.003**
Supervisors who reported no stockouts of **lancets** in the last six months	23	34	67.6	36	42	85.7	0.06
Supervisors who reported no stockouts of any equipment for **IV infusions** in the last six months	39	50	78.0	36	42	85.7	0.665
Supervisors who reported no stockouts of **puncture-resistant sharps containers** in the last six months	126	181	69.6	176	187	94.1	**0.000**

PLACEMENT OF EMERGENCY ORDERS

At follow-up, when supervisors were asked if there was a way to place an emergency order for equipment when they ran short, 53.2 percent reported that there was a procedure to place an emergency order for injection devices. A similar percentage of supervisors reported the existence of a procedure at baseline (53.3 percent). Of the 100 supervisors at follow-up who reported that there was a procedure, 19 had placed an order in the six months prior to the interviews. Among those who placed the order, most (78.9 percent) said that it took less than a week for the order to arrive.

For the 70 supervisors at follow-up who said there was no protocol for placing an emergency order, 35 (50 percent) would ask the patients to buy the equipment for themselves, 9 would go to nearby pharmacies and buy the supplies, 5 would collect from government stores, and the rest reported that they always have enough supplies.

ASSESSMENT OF RISKS TO THE PROVIDER

The survey assessed the risks of injections to providers, including practices and behaviors, through observations of the facility and practices, as well as interviews with providers and supervisors. The observations from 80 health care facilities were included in the assessment for both baseline and follow-up.

PRESENCE OF SHARPS CONTAINER IN LOCATIONS WHERE PROCEDURES ARE PERFORMED

At baseline, it was observed that although the majority of health facilities surveyed had sharps containers, only 27.9 percent had containers in each place where procedures were performed. However, at follow-up, the majority of health facilities had sharps containers in areas where procedures were performed. Specifically, all facilities had sharps containers where phlebotomies took place, 96.3 percent where therapeutic injections took place, 96.4 percent where IV procedures

took place, and 93.8 percent where vaccinations were given. In addition, 96.3 percent of facilities had one or more sharps containers "in stock" (in addition to those currently in use) at follow-up compared to only 63.8 at baseline (Table 21). All of these improvements were statistically significant.

Table 22. Observations on the Presence of Sharps Containers in all Areas where Procedures are Given

	Baseline			Endline			
	#	*n*	%	#	*n*	%	*P*
Health care facilities with at least one puncture-resistant and leakproof sharps container in all areas where **vaccinations** are given	43	80	53.8	75	80	93.8	**0.000**
Health care facilities with at least one puncture-resistant and leakproof sharps container in all areas where **therapeutic injections** are given*	47	61	77.0	77	80	96.3	**0.001**
Health care facilities with at least one puncture-resistant and leakproof sharps container in all areas where **phlebotomies** are performed	14	22	63.6	37	37	100.0	**0.000**
Health care facilities with at least one puncture-resistant and leakproof sharps container in all areas where **IV procedures** are performed	24	37	64.9	54	56	96.4	**0.000**
Health care facilities with one or more puncture-resistant sharps container "in stock"	51	80	63.8	77	80	96.3	**0.000**

* Observations were not made in 19 cases at baseline.

OBSERVATIONS OF JOB AIDS

Data collectors observed whether communications materials such as job aids to promote reducing the use of injections, safe administration of injections, or safe disposal of used injection equipment were posted in the health facilities. These materials were observed to be displayed in 97.5 percent of health facilities at follow-up compared to 11.2 percent at baseline.

USE OF NEW GLOVES

At follow-up data collectors were present during 148 injection procedures (50 at hospitals and 98 at lower-level facilities). The procedures included 67 vaccinations, 60 therapeutic injections, 17 family planning injections, and 4 dental procedures.

They observed whether providers used new gloves, used gloves but did not changed them, or wore no gloves for the injection. At follow-up, new gloves were worn by providers in 29 percent of observations compared to only 18 percent of observations at baseline. However, gloves are not needed for intramuscular, subcutaneous, and intradermal injections though gloves may be indicated if excessive bleeding is anticipated. New gloves were used in about half of family planning injections, but for vaccinations and therapeutic injections the majority of the providers did not use gloves at all. Because dental procedures are likely to include exposure to active bleeding, use of new gloves is essential. For dental procedures, new gloves were used in all four observations.

RE-CAPPING NEEDLES AFTER ADMINISTERING INJECTIONS

Re-capping needles poses a risk for injection providers due to increased exposure to blood-borne pathogens. Data collectors were asked to observe this practice and reported that almost all used syringes at follow-up (96.5 percent) were disposed of without being re-capped compared to only 68.1 percent at baseline, a statistically significant improvement.

If re-capping a syringe is unavoidable, the one-handed scoop technique is preferred. Of the five observations at follow-up where re-capping of used needles occurred, one-hand re-capping was done in three cases and two-hand re-capping in two cases. The results at follow-up show more providers used best practices for re-capping compared to baseline. Re-capping was done in 43 cases at baseline, and in more than half of the cases providers used both hands.

Table 23. Re-capping of Used Needles*

		Baseline		Endline		
		#	%	#	%	*P*
Vaccination	(n=59)			(n=67)		**0.004**
	One handed re-capping	4	7.0	-	-	
	Two handed re-capping	6	10.5	-	-	
	No re-capping	47	82.5	65	100.0	
	Total	57	100	65	100	
Therapeutic	(n=60)			(n=60)		**0.000**
	One handed re-capping	6	10.2	1	1.7	
	Two handed re-capping	19	32.2	1	1.7	
	No re-capping	34	57.6	56	96.6	
	Total	59	100	58	100	
Family Planning	(n=15)			(n=17)		0.083
	One handed re-capping	2	14.3	-	-	
	Two handed re-capping	2	14.3	-	-	
	No re-capping	10	71.4	15	100.0	
	Total	14	100	15	100	
Dental	(n=5)			(n=4)		0.894
	One handed re-capping	2	40.0	2	50.0	
	Two handed re-capping	2	40.0	1	25.0	
	No re-capping	1	20.0	1	25.0	
	Total	5	100	4	100	
All procedures	(n=139)			(n=148)		**0.000**
	One handed re-capping	14	10.4	3	2.1	
	Two handed re-capping	29	21.5	2	1.4	
	No re-capping	92	68.1	137	96.5	
	Total	135	100	142	100	

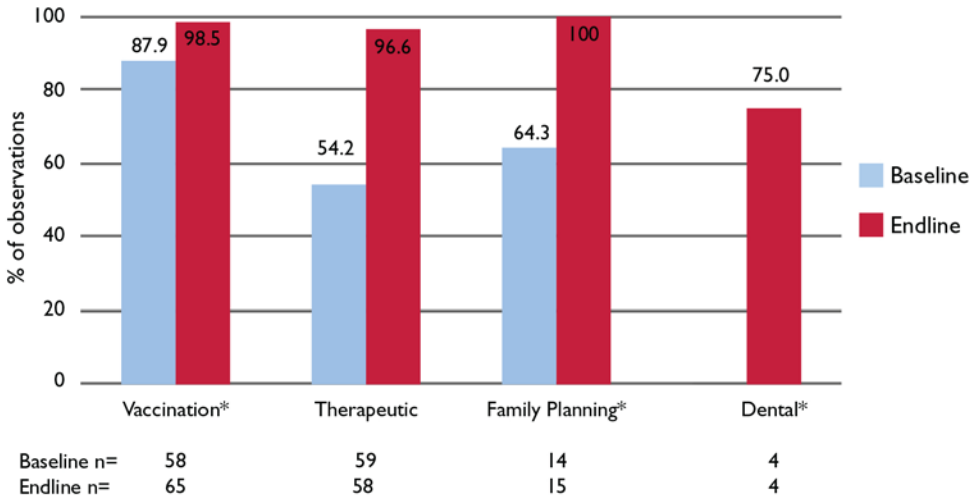
* Observations were not made in four cases at baseline and in six cases at endline.

USE OF A SHARPS CONTAINER FOR IMMEDIATE DISPOSAL OF USED SHARPS

Injection equipment needs to be safely disposed of immediately after injections are administered in order to protect injection providers, patients, and waste handlers from accidental injuries and exposure to pathogens. In 97.2 percent of the injection procedures at follow-up, providers appropriately disposed of the injection equipment immediately after the injection, compared to 68.1 percent at baseline; this difference was statistically significant. Of the procedures at follow-up, appropriate and immediate disposal of injection equipment was observed in 98.5 percent of vaccinations, 96.6 percent of therapeutic injections, 100 percent of family planning injections, and 75 percent of dental injections. Higher proportions of observations across all procedures at follow-up practiced safe disposal of used equipment compared to observations at baseline (Figure 7).

At follow-up sterilizable equipment was used in only one dental procedure, and data collectors observed that it was immediately disassembled and immersed in a container of water. Needle removers were not used in any observation.

Figure 7. Observations on Immediate Disposal of Sharp Objects After Use



*Differences between baseline and endline are statistically significant ($p<0.05$).

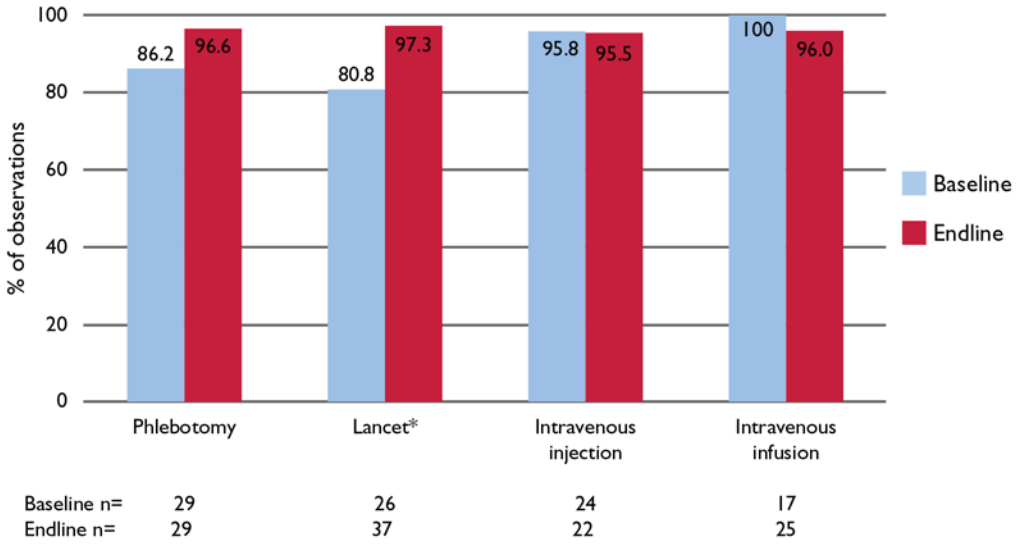
OBSERVATIONS OF PHLEBOTOMIES, LANCETS, INTRAVENOUS INFUSIONS, AND INTRAVENOUS INJECTIONS

Overall, 29 phlebotomies, 37 lancets, 22 IV injections, and 25 IV infusions were observed.

SECURE POSITIONING OF THE PATIENT

Data collectors observed providers to see if they securely positioned the patient and the intended puncture site so that the patient could not move while the injection was being administered. If a patient moves during the procedure, this could result in an accidental needle-stick injury. At both baseline and follow-up, almost all providers securely positioned the patient's body (Figure 8).

Figure 8. Secure Positioning of the Patient Prior to Injection

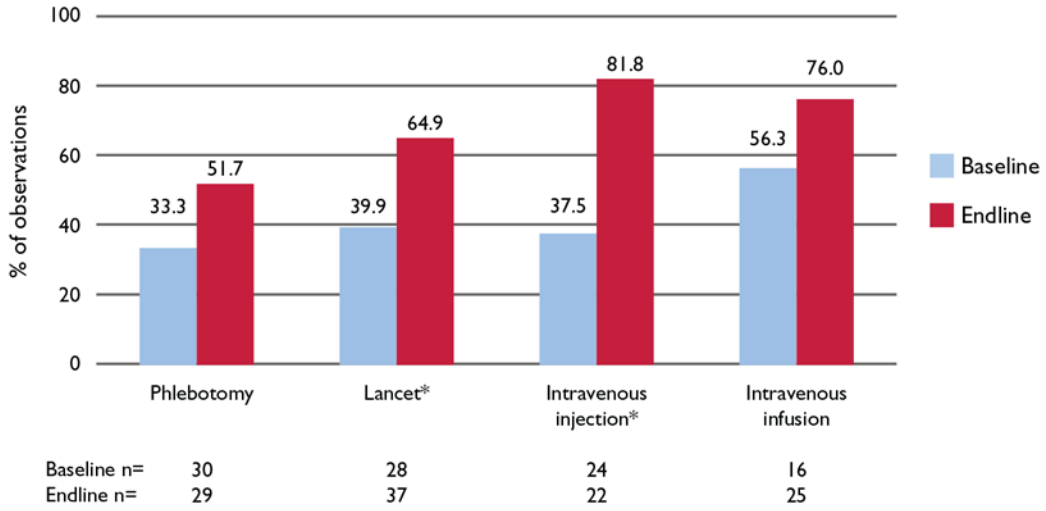


*Differences between baseline and endline were statistically significant ($p<0.05$).

USE OF NEW GLOVES

Data collectors observed whether providers used new gloves, used gloves but did not change them, or did not wear gloves for the procedures that they performed. Providers used new gloves in 67.2 percent of all procedures at follow-up compared to only 39.8 percent at baseline, and this difference was found to be statistically significant. New gloves were used in 51.7 percent of phlebotomies, 64.9 percent of lancets, 76 percent of infusions, and 81.8 percent of injections (Figure 9). However, glove use is not required for lancet procedures unless it is likely that the provider will come in contact with blood or body fluids.

Figure 9. Use of New Gloves During Procedures



Note:
Gloves are not required for lancet procedures unless the provider anticipates contact with blood or body fluids.

* Differences between baseline and endline are statistically significant ($p<0.05$).

RE-CAPPING NEEDLES AFTER PROCEDURES

In almost all observations at follow-up, providers did not use only their hands to remove an uncapped needle from a device (93.8 percent). There were also significant improvements in observations of no two-handed recapping of needles after a procedure (95.6 percent). The proportions observed at baseline were lower for both safe practices (Table 24). Of the phlebotomy observations with a blood transfer, over half of the providers (57.1 percent) did not use a two-handed transfer technique compared to 15.8 percent at baseline, a statistically significant improvement.

Table 24. Re-capping of Needles

		Baseline			Endline			
Observations in which no uncapped needles were removed from a device using only hands		**#**	***n***	**%**	**#**	***n***	**%**	***P***
	Phlebotomy	19	30	63.3	27	29	93.1	**0.006**
	Lancet	25	25	100	37	37	100	0.229
	IV injection	21	24	87.5	19	22	86.4	0.909
	IV infusion	14	17	82.4	23	25	92.0	0.343
	Total	79	96	82.3	106	113	93.8	**0.006**
Observations in which there was no two-handed re-capping								

		Baseline			Endline			
	Phlebotomy	18	30	60.0	26	29	89.7	**0.009**
	Lancet	25	25	100	37	37	100	0.229
	IV injection	14	24	58.3	21	22	95.5	**0.003**
	IV infusion	15	17	88.2	24	25	96.0	0.338
	Total	72	96	75	108	113	95.6	**0.000**
Observations in which blood was not transferred from a syringe/needle directly into a vacuum tube using a two-handed technique								
	Phlebotomy	3	19	15.8	8	14	57.1	**0.013**

* Observations were not made in three cases at baseline.

USE OF AN APPROPRIATE CONTAINER FOR DISPOSAL OF WASTE

Out of all IV procedures observed at follow-up, 85.6 percent of providers immediately disposed of used sharps in a sharps container. This included all lancets, 93.1 percent of phlebotomies, 68.2 percent of IV injections, and 69.6 percent of infusions. At baseline only half of providers were observed immediately disposing of used sharps in a sharps container.

Neither a needle remover or needle destroyer was used in any observed procedures at baseline or at follow-up, and this information was verified by interviews where only 7 out of the 217 (baseline) and 2 of the 212 injection providers (follow-up), reported having used a needle remover or needle destroyer six months prior to the survey. Seventy-seven percent of procedures at follow-up, compared to 42.6 percent at baseline, appropriately disposed of non-sharps infectious waste, a statistically significant improvement. None of the procedures used sterilizable equipment.

Table 25. Immediate Disposal of Waste

		Baseline			Endline			
		#	***n***	**%**	**#**	***n***	**%**	***P***
Observations in which the used sharp was immediately disposed of in a sharps container*								
	Phlebotomy	17	30	56.7	27	29	93.1	**0.001**
	Lancet	17	28	60.7	37	37	100.0	**0.000**
	IV injection	10	23	43.5	15	22	68.2	0.095
	IV infusion	4	14	28.6	16	23	69.6	**0.015**
	Total	48	95	50.5	95	111	85.6	**0.000**
Observations in which non-sharps infectious waste was disposed of in an appropriate container*								
	Phlebotomy	16	29	55.2	26	29	89.7	**0.003**

		Baseline			Endline			
		#	*n*	%	#	*n*	%	*P*
	Lancet	11	27	40.7	33	37	89.2	**0.000**
	IV injection	8	23	34.8	12	22	54.5	0.182
	IV infusion	5	15	33.3	16	25	64.0	0.06
	Total	40	94	42.6	87	113	77.0	**0.000**

* Observations were not made in four cases at baseline and in two cases at endline.

** Observations were not made in five cases at baseline.

INTERVIEW WITH INJECTION PROVIDERS

In total, 217 injection providers were interviewed at baseline and 212 at follow-up.

CHARACTERISTICS OF THE PROVIDERS

The majority of the injection providers who were interviewed at follow-up were either nurses (34 percent) or community health officers/extension workers (37.3 percent). Laboratory scientists or technicians composed 19.8 percent of the interviewees. There were very few physicians (1.4 percent) and dentists (1.9 percent) (Table 26).

At follow up, most providers were between the ages of 21 and 40 years (68.4 percent), and a significant proportion was aged 41 and above (31.1 percent). More than half of the providers were female (56.1 percent). One to ten years of post-qualification experience was most common among providers (52.8 percent), followed by 11-20 years of experience (22.6 percent).

Table 26. Provider Characteristics

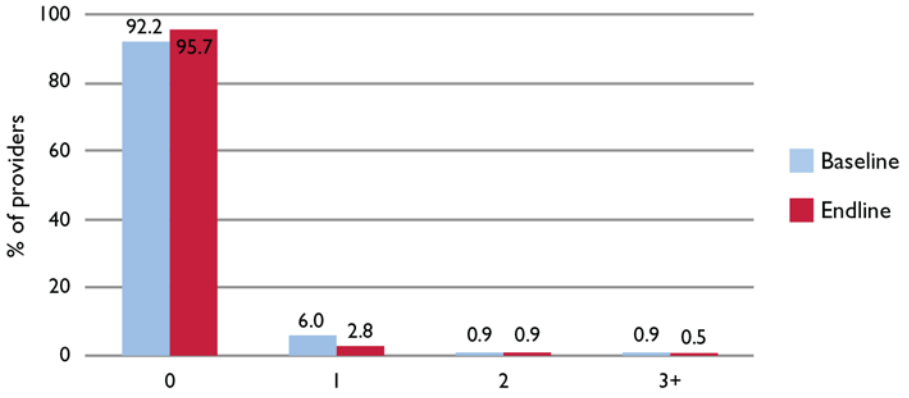
		Baseline		Endline		
		n	%	*n*	%	*P*
Type of Provider						
	Nurse	58	26.9	72	34.0	**0.041**
	Physician	7	3.2	3	1.4	
	Lab scientist/technician	44	20.4	42	19.8	
	Community health officer/extension worker	88	40.7	79	37.3	
	Dentist	4	1.9	4	1.9	
	Other	15	6.9	12	5.7	
	Total	216	100.0	212	100.0	
Age						
	<20	-	-	1	0.5	0.436
	21-30	73	33.6	66	31.1	
	31-40	82	37.8	79	37.3	

		Baseline		Endline		
		n	**%**	***n***	**%**	***P***
	41-50	47	21.7	41	19.3	
	51-60	15	6.9	24	11.3	
	>60	-	-	1	0.5	
	Total	217	100	212	100	
Sex						
	Male	102	47.0	93	43.9	0.514
	Female	115	53.0	119	56.1	
	Total	217	100	212	100	
Years of post qualification experience						
	<1	6	2.8	8	3.8	0.463
	1-10	117	55.2	112	52.8	
	11-20	55	25.9	48	22.6	
	21-30	28	13.2	31	14.6	
	>30	6	2.8	13	6.1	
	Total	212	100.0	212	100.0	

ACCIDENTAL NEEDLE-STICK INJURIES AND POST-EXPOSURE PROPHYLAXIS

Injection providers were asked whether they had experience accidental needle-stick injuries in the six months before the follow-up survey, and 95.7 percent replied that they had not. Of those who experienced accidental needle-stick injuries, the majority reported experiencing it only once (76.5 percent).

Figure 10. Frequency of Accidental Needle-Stick Injuries Among Injection Providers Interviewed



At follow-up few providers (14.6 percent) reported that guidelines outlining post-exposure management procedures were available, while 8.5 percent did not know if such guidelines existed in their facilities. Almost half of the providers said that support and counseling was available for providers who were exposed to blood and body fluids, while one-third reported that PEP was provided for high-risk exposures. Data collectors observed documents such as "Guidelines for Providing Post-Exposure Prophylaxis" by Global HIV/AIDS Initiative Nigeria (GHAIN) and "Managing Occupational Exposure to HIV" by FHI/GHAIN.

Out of ten providers who experienced a needle-stick injury during the six months prior to the follow-up survey, only three reported the injury to their supervisor; however, only one of the three was offered infectious disease testing. Of those who did not report the injury, 40 percent reported going for infectious disease testing on their own (Table 27).

Table 27. Post-Exposure Prophylaxis and Disease Testing

	Baseline			Endline			
	#	*n*	%	#	*n*	%	*P*
Providers who reported that guidelines outlining all post-exposure management procedures were available	31	217	14.3	31	212	14.6	0.921
Providers who reported availability of support and counseling for blood and body fluid exposures	81	217	37.3	96	212	45.3	0.094
Providers who reported that PEP was provided for high-risk exposures*	62	213	29.1	57	210	27.1	0.653
Of providers who had a needle-stick injury, proportion who reported the injury to their supervisor	7	17	41.2	3	9	33.3	0.561

	Baseline			Endline			
	#	n	%	#	n	%	P
Of those providers who reported their injury, proportion who were offered infectious disease testing	4	7	57.1	1	3	33.3	0.49
Of those providers who did not report their injury, proportion who went for infectious disease testing on their own	7	14	50.0	4	10	40.0	0.628

* Data missing in four cases at baseline and two cases at endline.

INJECTION PROVIDERS WHO RECEIVED TRAINING ON INJECTION SAFETY

Most (84.8 percent) of the interviewed injection providers reported receiving training on injection safety in the two years prior to the follow-up survey in a formal lecture or workshop compared to fewer than one-third (30.1) of the providers interviewed at baseline.

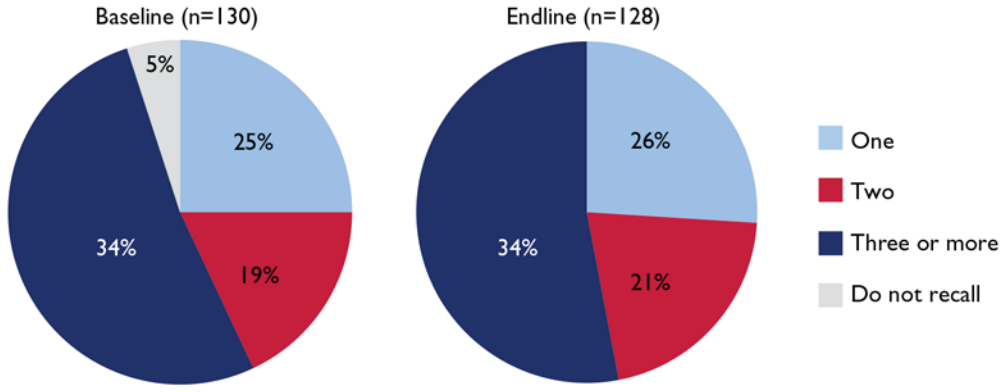
PROVIDERS' KNOWLEDGE OF DISEASE TRANSMITTED BY REUSE OF NON-STERILE NEEDLES

When asked about their knowledge of disease, 99.1 percent of interviewed providers at follow-up were aware of at least one disease that can be transmitted via unsafe injection. Majority of the providers mentioned HIV (95.8 percent), hepatitis B (82.1 percent), and hepatitis C (48.6 percent). Most providers interviewed at baseline mentioned the same three diseases: 91.7 percent mentioned HIV, 67.7 percent mentioned hepatitis B, and 31.8 percent mentioned hepatitis C. Almost half (42.9 percent) of providers at follow-up mentioned all three diseases, compared to only 25.3 percent of providers at baseline. This difference was found to be statistically significant. Other diseases mentioned by providers at both baseline and follow-up include malaria, tuberculosis, tetanus, yellow fever, infections or abscesses, and hepatitis D.

INJECTION PROVIDERS VACCINATED AGAINST HEPATITIS B

Similar to baseline, sixty percent of injection providers reported receiving the hepatitis B vaccine. Among those who had the vaccine, 53 percent received the full protective dosage of three or more doses. Of the remaining providers who received the vaccine, half received only one dose and the other half received two (Figure 11).

Figure 11. Number of Hepatitis B Vaccine Doses Received by Injection Providers*



*Data missing in three cases at baseline.

INTERVIEWS WITH SUPERVISORS OF INJECTION PROVIDERS

Data collectors interviewed 189 supervisors at baseline and 188 at follow-up. At baseline, 114 of the supervisors were in hospitals and 75 were in lower-level facilities, while at follow-up 102 were in hospitals and 86 were in lower-level facilities.

CHARACTERISTICS OF THE SUPERVISORS

Of the supervisors interviewed at follow-up, most were either nurses (43.1 percent) or community health officers and/or extension workers (31.9 percent). A majority of the supervisors were aged 31-40 and slightly over half (51.6 percent) were men. The largest proportion of supervisors (33.2 percent) had 21-30 years of post-qualification experience. There was no difference in the distribution of characteristics between supervisors who were interviewed at baseline and follow-up (Table 27).

Table 28. Characteristics of the Supervisors

		Baseline		Endline		P
		n	%	*n*	%	
Type of Provider						
	Nurse	73	38.8	81	43.1	0.37
	Physician	7	3.7	1	0.5	
	Lab scientist/technician	37	19.7	34	18.1	

		Baseline		Endline		P
		n	%	*n*	%	
	Community health officers/extension workers	61	32.4	60	31.9	
	Dentist	5	2.7	4	2.1	
	Other	5	2.7	8	4.3	
	Total	188	100.0	188	100.0	
Age						
	<20	-	-	-	-	0.833
	21-30	20	10.6	17	9.0	
	31-40	53	28.2	52	27.7	
	41-50	77	41.0	85	45.2	
	51-60	38	20.2	34	18.1	
	>60	-	-	-	-	
	Total	188	100	188	100.0	
Sex						
	Male	98	52.4	97	51.6	0.875
	Female	89	47.6	91	48.4	
	Total	187	100	188	100	
Years of post qualification experience						
	<1	-	-	1	0.5	0.752
	1-10	45	24.5	43	23.0	
	11-20	57	31.0	57	30.5	
	21-30	64	34.8	62	33.2	
	>30	18	9.8	24	12.8	
	Total	184	100.0	187	100.0	

AVAILABILITY OF POLICIES AND GUIDELINES

Supervisors were asked whether injection safety and health care waste management policies and guidelines were available in their unit or facility. The majority of supervisors (81.9 percent) reported that both policies were available in their unit or facility, 60.1 percent of which were able to show a copy of the policies and guidelines. This was a statistically significant improvement from baseline where only 24 out of the 189 supervisors interviewed reported that both policies were available, and 2 were able to show copies (Table 28).

Table 29. Availability of Policies and Guidelines

		Baseline		Endline		P
		n	%	*n*	%	
Injection safety policy						**0.000**
	Yes, and it was shown	10	5.3	113	60.1	
	Yes, but it was not shown	30	16.0	43	22.9	
	No, there is no policy	145	77.1	28	14.9	
	Don't know	3	1.6	4	2.1	
	Total	188	100	188	100	
Health care waste disposal policy						**0.000**
	Yes, and it was shown	4	2.2	113	60.1	
	Yes, but it was not shown	28	15.1	41	21.8	
	No, there is no policy	150	80.6	30	16.0	
	Don't know	4	2.2	4	2.1	
	Total	186	100	188	100	
Both policies available						
	Yes, and both were shown	2	1.1	113	60.1	**0.000**
	Yes, but not shown	22	11.6	41	21.8	**0.008**
	Total	24	12.7	154	81.9	**0.000**

POST-EXPOSURE PROPHYLAXIS

Supervisors were asked whether records were maintained for occupational exposures. At follow-up, a statistically significantly higher percentage of supervisors (17 percent) reported that they were maintained compared to only 10.7 percent at baseline; however, 5.3 percent of the 188 supervisors at follow-up reported that they did not know. Similar to baseline, approximately one-third (61 out of 187) of supervisors at follow-up reported that PEP was provided for high-risk exposures. Supervisors who reported that PEP was provided said antiretrovirals were the most common types of prophylaxis offered.

ASSESSMENT OF RISKS TO WASTE HANDLER

INTERVIEWS WITH WASTE HANDLERS

To assess the risks of injection use to waste handlers, data collectors collected information through interviews with 80 waste handlers and 189 supervisors at baseline and 78 waste handlers and 188 supervisors at follow-up. The majority of waste handlers interviewed at baseline were women, whereas at follow-up there was an even split between male and female waste handlers interviewed. This difference in sex distribution almost reached statistical significance. A higher proportion of waste handlers at follow-up were older than 40 years old. The age distribution of waste handlers did not differ between baseline and follow-up.

Table 30. Characteristics of Waste Handlers

		Baseline		Endline		P
		n	%	*n*	%	
Age						
	<20	-	-	-	-	0.861
	21-30	20	25.0	16	20.5	
	31-40	20	25.0	20	25.6	
	41-50	23	28.8	20	25.6	
	51-60	16	20.0	21	26.9	
	>60	1	1.3	1	1.3	
	Total	80	100	78	100	
Sex						
	Male	28	35.0	39	50.0	0.056
	Female	52	65.0	39	50.0	
	Total	80	100	78	100	

TRAINING OF WASTE HANDLERS

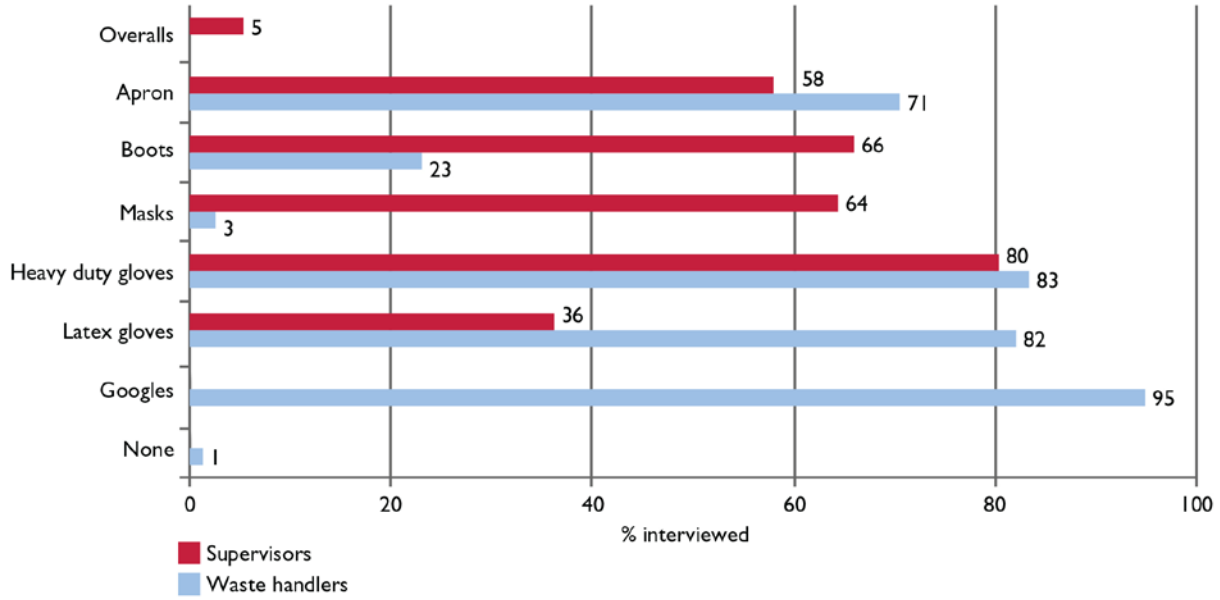
A significantly higher proportion of waste handlers interviewed at follow-up (85.7 percent) than at baseline (13.8 percent) reported that they had received training on safer ways of handling and disposing of waste ($p<0.001$).

AVAILABILITY OF PERSONAL PROTECTIVE EQUIPMENT

When waste handlers were asked about personal protective equipment, nearly all of them (98.7 percent) reported that at least one type of equipment was available to protect them from injuries at their workplace. This was confirmed by interviews with supervisors, who all reported that protective equipment was available for waste handlers. However, there was a discrepancy in the type of protective equipment available reported by supervisors and waste handlers, with waste handlers reporting goggles and supervisors reporting heavy duty gloves as the most common at follow-up (Figure 13). More waste handlers (66 percent) and supervisors (14.9 percent) at baseline compared

to follow-up reported that equipment was not available for waste handlers, and this difference was found to be statistically significant.

Figure 12. Type of Protective Equipment Available to Waste Handlers at Follow-up According to Type of Interviewee



ACCIDENTAL NEEDLE-STICK INJURIES

Almost all of the waste handlers (96.2 percent) who were interviewed at follow-up reported that they had not had any accidental needle-stick injuries with used equipment in the six months prior to the survey. Only three waste handlers (3.8 percent) reported experiencing a needle-stick injury at follow-up compared to 11 (13.8 percent) at baseline, a statistically significant improvement. Two out of the three reported the injury to their supervisor, and both were offered testing for infectious disease. The one waste handler who did not report his or her injury did not seek infectious disease testing (Table 31).

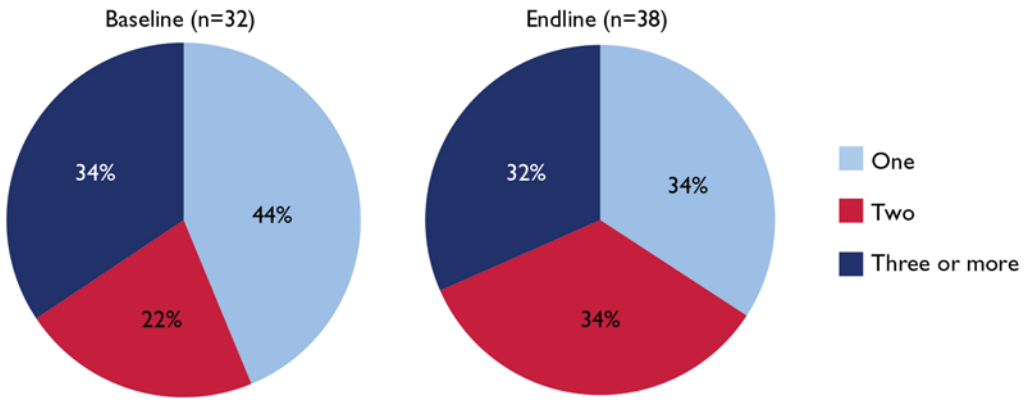
Table 31. Accidental Needle-Stick Injuries

	Baseline			Endline			P
	#	*n*	%	#	*n*	%	
Needle stick injury in the past six months	11	80	13.8	3	78	3.8	**0.029**
Injury was reported to supervisor	5	11	45.5	2	3	66.7	0.515
Testing was offered after injury was reported	2	5	40.0	2	2	100.0	0.147
Injury was not reported but testing was sought	1	5	20.0	-	-	-	NA

HEPATITIS B VACCINATION OF WASTE HANDLERS

Of the waste handlers interviewed at baseline and follow-up, less than half were vaccinated against hepatitis B (40 percent and 48.7 percent respectively). Of the 38 waste handlers who were vaccinated at follow-up, 31.6 percent received the full protective dosage of three or more vaccine doses, 34.2 percent received two doses, and 34.2 percent received only one dose (Figure 13). Compared to baseline, more waste handlers received two doses at follow-up; however, there was no change in the proportion of waste handlers who received the full protective dosage.

Figure 13. Number of Hepatitis B Vaccine Doses Received by Waste Handlers



ASSESSMENT OF RISK TO THE COMMUNITY

Data collectors observed procedures and conditions at 80 facilities at both baseline and follow-up.

CONDITION OF SHARPS CONTAINERS

Sharps containers need to be properly used in order to guarantee injection safety. Data collectors observed whether pierced or overflowing boxes were present at facilities, and they found that at follow-up only 11 out of 80 facilities (13.7%) had these present. Only ten facilities (12.5 percent) were observed with sharps in an open container in any area of the facility compared to almost one-third (31.2 percent) of the facilities observed at baseline, a statistically significant improvement.

Data collectors also observed whether sharps containers awaiting final destruction were completely closed. At follow-up, less than half of the facilities observed had their containers completely closed. In addition, only 27.8 percent of all sharps containers awaiting final destruction were stored in a locked area or otherwise stored safely away from public access (Table 31).

Table 32. Condition of Sharps Containers

	Baseline			Endline			P
	#	*n*	%	#	*n*	%	
Health facilities in which there were no overflowing or pierced sharps containers in any area of the facility	60	80	75.0	69	80	86.3	0.072
Health facilities in which there were no sharps in an open container in any area of the facility	55	80	68.8	70	80	87.5	**0.004**
Health facilities in which all sharps containers awaiting final destruction were completely closed	30	79	38.0	17	35	48.6	0.266
Health facilities in which all sharps containers awaiting final destruction were stored in a locked area or otherwise stored safely away from public access	34	79	43.0	10	36	27.8	.118

WASTE SEGREGATION

Data collectors observed whether facilities segregated waste generated by injections into different containers for used sharps waste, infectious waste, and non-infectious waste. This strategy is recommended to contain used sharps and infectious waste from municipal waste. Eighty-five percent of facilities at follow-up sorted waste into appropriate containers compared to only 20 percent of the facilities at baseline, a statistically significant improvement.

SHARP OBJECTS OUTSIDE OF THE HEALTH CARE FACILITY

The grounds outside each health facility were observed for any loose sharps lying around. Data collectors observed that two-thirds of facilities at follow-up had no used sharps lying around their grounds. For this variable, a similar proportion of facilities were observed at baseline.

WASTE DISPOSAL METHODS

At both baseline and follow-up the most common methods for final waste disposal of used sharps waste was open burning in a hole or enclosure and open burning on the ground. Safe methods such as closed burning in a medium- or high-temperature incinerator or furnace, dumping in a secure pit, or transport for offsite treatment were used by very few facilities (15 out of 80 facilities at baseline and 16 out of 80 facilities at follow-up) (Table 33).

Table 33. Main Methods of Sharps Waste Disposal

	Baseline		Endline		P
	#	%	#	%	
Open burning in a hole or in an enclosure	39	48.8	41	51.3	0.752
Open burning on the ground	26	32.5	20	25.0	0.295
Transportation for off-site treatment	14	17.5	12	15.0	0.668
Burial	4	5.0	8	10.0	0.230
Low temperature incineration/burning	8	10.0	5	6.3	0.385
Dumping in an unsupervised area	6	7.5	4	5.0	0.514

	Baseline		Endline		P
	#	%	#	%	
High or medium temperature incineration	1	1.3	2	2.5	0.560
Dumping in an unprotected pit	13	16.3	7	8.8	0.151
Dumping in a protected (secure) pit (including a needle pit)	-	-	2	2.5	0.155

MINIMUM PACKAGE FOR HEALTH CARE WASTE MANAGEMENT

The minimum required package for HCWM for health facilities is the adherence to:

1. Proper waste segregation
2. Storage in a locked area
3. Treatment using medium or high-temperature incineration, dumping in a protected pit, or transportation for offsite treatment
4. Disposal in an ash pit if on-site high-temperature incineration is used.

The survey used in this assessment was able to assess the first three of the four requirements. Only 2 of the 80 (2.5 percent) baseline facilities and 4 of the 80 (5 percent) follow-up facilities met the minimum required package for HCWM outlined above.

CONCLUSION

There was a marked improvement since baseline in infection prevention and control practices protecting providers, patients, and community members from the risk of infection with HIV or other blood-borne pathogens. Despite the improvements, some key areas were still lacking.

WASTE DISPOSAL

Proper waste disposal decreases the risk of infection for both providers and patients who come in contact with them. A statistically significant increase in the number of facilities with properly contained infectious waste (non-sharps) was observed at follow-up. However, there was no change in proper disposal of used sharps after the intervention, with approximately one-fourth of facilities still having sharps, loose disposable needles and syringes, or IV infusion equipment lying around the facility.

HYGIENE

Statistically significant increases in health facilities with running water and soap for washing hands as well as facilities with alcohol-based hand sanitizer for cleansing hands were observed; however, the overall proportions of available hand washing options were still low. Running water and soap were available in less than half of all facilities observed, and less than 10 percent had alcohol-based hand rub for cleansing hands.

A statistically significant increase in hand washing before any vaccination, therapeutic, family planning, or dental injections was also observed. But the percentage at follow-up was still low. A statistically significant increase in hand washing before IV procedures was also observed at follow-up; however this percentage was observed to be even lower than for injections. Of the 113 providers interviewed at follow-up, only 25 used soap and running water and 3 used sanitizer. Overall there were fewer injections observed at follow-up where the patient's skin was cleaned in an appropriate manner compared to baseline.

After the intervention, the majority of the injections were prepared on a clean work table or tray during vaccination, therapeutic, family planning, and dental procedures, a statistically significant increase compared to baseline; however, there was no change in the proportion of phlebotomies, IV injections, and IV infusions that were prepared on work table or tray with proper hygienic conditions.

INJECTION PRACTICES

All providers removed the needle from the rubber cap after withdrawing the dose in all of the injections that used a multi-dose vial for vaccination, therapeutic, and dental procedures at follow-up, a statistically significant increase over baseline. Proper care of multi-dose vials to prevent contamination of injectable medications was practiced by nearly all providers; however, in two vaccination procedures providers used antiseptic to clean the cap of the vial, which could compromise the efficacy of the vaccine. Compared to baseline, significantly more injection providers at follow up used a barrier to protect their fingers when breaking glass ampoules; however, a

majority still did not (61.1 percent). However, at follow-up, the use of appropriate diluents for injections was observed in fewer injections compared to baseline.

INJECTION SUPPLIES

Across all types of injection equipment, fewer stockouts were reported at follow-up compared to baseline. The number of health facilities with enough auto-disable injection equipment and enough disposable phlebotomy equipment for at least two weeks showed a statistically significant improvement compared to baseline. Statistically significant improvements were seen for supervisors who reported no stockouts of any disposable phlebotomy equipment and no stockouts of puncture-resistant sharps containers in the last six months. However, nearly half (46.8 percent) of facilities did not have a procedure in place for placing emergency orders for injection devices when stockouts do occur.

RISK TO THE PROVIDER

Providers are often exposed to risks that can be avoided by proper injection safety practice. Without proper training, injection providers not only expose themselves but also patients and community to HIV and other blood-borne pathogens. A majority of injection providers received training on injection safety in the two years prior to the follow-up survey, and this was a significant increase from baseline when less than one third reported receiving training. The higher proportion of trained providers was apparent in better injection practices such as proper waste disposal and use of new gloves among injection providers at follow-up.

POLICY AND GUIDELINES

Policies and guidelines are necessary to protect providers and patients and to support injection safety practices. At follow-up, most facilities had both injection safety and waste management policies in place, and a majority was able to show copies of the policy and guidelines. This was a statistically significant improvement from baseline.

WASTE DISPOSAL

Unsafe disposal practices increase the likelihood of accidental needle-stick injuries from used sharps. Statistically significant increases were seen in the number of health care facilities with at least one puncture-resistant and leakproof sharps container in all areas where injections and IV procedures are performed as well as the number of health care facilities with one or more puncture-resistant sharps container in stock.

Higher proportions of observations across all procedures at follow-up practiced safe disposal of used equipment compared to observations at baseline.

PRESENCE OF JOB AIDS

Communications materials such as job aids were posted in almost all (97.5%) of the health facilities at follow-up to promote safe injection administration, safe disposal of used injection equipment, and limited use of injections, a significant increase over baseline.

USE OF GLOVES

Providers used new gloves in 67.2 percent of all intravenous procedures at follow-up compared to only 39.8 percent at baseline, and this difference was found to be statistically significant. Only 8.8 percent of providers did not use gloves at all for the procedures, which is statistically significantly lower than the 38.8 percent at baseline.

RE-CAPPING OF USED SHARPS

The results at follow-up show more providers use best practices for re-capping compared to results from baseline. At follow-up, the majority of providers did not re-cap syringes prior to disposal, which reduces their risk of exposure to blood-borne pathogens and the difference compared to baseline was found to be significant.

ACCIDENTAL NEEDLE-STICK INJURIES AND POST-EXPOSURE PROPHYLAXIS

Very few providers reported experiencing accidental needle-stick injuries in the six months before the follow-up survey (4.3 percent), and most of those who reported a needlestick only experienced it once. When asked about guidelines outlining all post-exposure management procedures, only 14.6 percent of providers reported that the guidelines were available. Similar to baseline, one third of providers mentioned that PEP was provided for high-risk exposures. Hepatitis B vaccination did not improve compared to baseline, with still only half of the providers receiving the complete course of three or more doses.

RISK TO THE WASTE HANDLER

A significantly higher proportion of waste handlers were trained on safer ways of handling and disposing of waste at follow up. Needle-stick injuries were rare among waste handlers (3.8 percent). However, although waste handlers face constant risk of exposure to blood-borne pathogens, less than half of all waste handlers were vaccinated against hepatitis B, and only 32 percent received the full course of three or more doses.

RISK TO THE COMMUNITY

Better waste management practices at facilities were observed at follow-up compared to baseline. A statistically significant increase in health facilities in which there were no sharps in an open container in any area of the facility was observed; however, few facilities made sure that full containers awaiting final destruction were fully closed and stored in a locked area away from public access. One-third of facilities also had used sharps lying around their grounds, where community members could easily come into contact with them. Safe methods for final waste disposal of used sharps waste at facilities include closed burning in a medium- or high-temperature incinerator or furnace; however, data collectors also did not observe an increase in the practice of these safe methods at follow-up.

After the intervention, there was a small increase in the number of facilities that met the three of the four requirements for safe HCWM. However, the definition of the standard has changed. The National Primary Healthcare Development Agency HCWM strategy prompted the new standards and separated primary health centers and hospitals with different standards by level of facility.

RECOMMENDATIONS

All cadres of health personnel in the target states should receive appropriate training. This training should include management of injection supplies, including HCWM, and logistics to support safe injection practices. Providers, supervisors, and managers should be trained together in each facility to ensure compliance with safe practices. A cascade training approach could be used to ensure that large hospitals with many departments are covered. Also, providing personal protective equipment and job aids are important to ensure compliance and sustain learning.

In addition, advocacy to policymakers should be aimed at outlining the responsibilities of the federal, state, and LGA levels and ensure that a budget line for procurement of essential commodities is secured at all levels. Other policy changes that should occur to promote injection safety include Federal Executive Council approval of HCWM Policy and Strategy as well as enforcement of the policy.

Overall recommendations include the following:

- **National level:** The FMOH should disseminate sufficient quantities of national guidelines and support development of procedures and guidelines, including waste disposal guidelines, at the district and facility levels.
- **Provider and waste handler safety:** Proper personal protective equipment and job aids should be made available, and PEP should be routinely provided in the event of accidental needle-sticks. Hepatitis B vaccination should also be provided on a routine basis and free of cost for workers at all levels.
- **Waste management:** All facilities should institute proper sharps waste management through to final disposal. Waste should be properly segregated at the point of generation into sharps containers and bins for infectious and non-infectious waste with color coded bin liners.
- **Community level:** A culturally appropriate outreach campaign that uses media to address risks to patients and community members on the dangers of unsafe and unnecessary injections should be conducted in order to build awareness of the community's role in ensuring safety during injections.

Additional national-level recommendations include the following:

- Ensure government support for a similar assessment in private sector facilities for comparison.
- Support the establishment of reporting and documentation of needle-stick injuries in all facilities.
- Establish a monitoring team with rewards for good practices (e.g., rewarding the two top performing facilities to encourage others to increase their efforts).
- Encourage an annual National HCWM Summit to share best practices and lessons learned.
- The national and healthcare worker hand washing promotion campaign should be encouraged.

At the facility level, it is vital to ensure that all staff members understand the dangers of unsafe injection practices. All facilities should have, and ensure that all providers understand, essential documents about injection safety and safe handling of injection waste. Other recommendations to ensure safe injection practices in facilities—including practices that protect providers—include the following:

- Operationalize national guidelines by developing facility-level guidelines, standard operating procedures, waste management guidance, and enforcement mechanisms at each facility, covering every type of injection provided and each unit that provides injections. These guidelines should be monitored and reviewed annually.
- Establish an infection prevention and control committee at each facility for implementation of safe injection practices as a component of infection prevention and control.
- Provide continuous training and on-the-job training for health care workers.
- Develop clear plans and policies for the proper management and disposal of waste to ensure continuity and clarity in management practices. These need to be integrated into routine employee training and continuing education.
- Provide a full supply of personal protective equipment and enforce its use.
- Have in place a procurement plan for all commodities and an emergency plan to address unanticipated demands for supplies. Facility management should be able to improvise locally manufactured equipment for infrastructural amenities, such as water receptacles (buckets with taps in the absence of running water in rural settings) to ensure proper hand washing practices.
- Advocate for appropriate policy and guidelines to ensure adequate availability, training, and systems in place for the provision of PEP for all health care workers in the event of an accidental needle-stick or injury.
- Advocate for appropriate policy and guidelines to ensure that all health care workers who are in contact with injection equipment receive the full course of the hepatitis B vaccination.

Additional recommendations to ensure safe disposal of injection-related waste include the following:

- Encourage the designation of full-time waste handlers to ensure consistent waste handling procedures.
- Institute proper sharps management in all health facilities to reduce the risk of disease transmission from medical waste. This would include wide distribution of sharps containers and essential equipment in every unit where sharps are used, as well as proper training of all personnel on the handling and management of sharps and personnel protection.
- Establish waste handling processes and procedures in line with the draft national policy and guidelines on HCWM, and include these procedures in all training.
- Provide waste management training to providers, supervisors, and waste handlers in facilities, covering the risks that waste poses, how to manage waste, and how to prevent exposure to diseases transmitted through infectious waste and non-sterile needles.

- Promote the minimum standard for waste disposal (i.e., proper waste segregation; storage of waste in a locked area; treatment using medium- or high-temperature incineration, dumping in a protected pit, or transportation for offsite treatment; and disposal in an ash pit if on-site high-temperature incineration) in all facilities.
- Use environmental health officers to inspect the health care facility for waste management. This cadre can be used for continuous monitoring, enforcement, and follow-up for safe disposal practices at the federal, state, and LGA levels. In addition, teams from the FMOH should be trained to check for compliance and provided support to allow them to conduct routine supervision.

At the community level, mobilization strategies should be used to discourage community members from reusing syringes. Outreach efforts should adopt a community-based approach that engages stakeholders, community leaders, and youth leaders, but should also involve and include health professionals and organizations. Campaigns to raise awareness might include the use of simple flyers and radio messages to provide information. Community-level recommendations include the following:

- Continue use of local languages to furnish information on safer injection practices to low literate waste handlers and communities.
- Ensure key roles for the LGAs and primary health care in implementation of interventions.
- Support communities to provide signposts and warnings at dumping sites for medical waste.

REFERENCES

Akpan, T., D. B. Shanadi, E. Collins, M. Noel, and A. Sowande. 2009. *Evaluation of Infection Safety and Health Care Waste Management in Nigeria: 2009 Comparison Report*. Washington, DC: U.S. Agency for International Development. Available at http://pdf.usaid.gov/pdf_docs/PNADR651.pdf (accessed March 2013)

Government of Nigeria. 2004. *Injection Safety Assessment in Nigeria*. Available at http://nigeria.usembassy.gov/uploads/images/McLyWtfPi8-VIVCnFmfaLQ/Injection_Safety_Assessment_in_Nigeria.pdf (accessed March 2013)

Kane, A., J. Lloyd, M. Zaffran, L. Simonsen, and M. Kane. 1999. "Transmission of Hepatitis B, Hepatitis C, and Human Immunodeficiency Viruses Through Unsafe Injections in the Developing World: Model-based Regional Estimates." *Bulletin of the World Health Organization*, 41:151–154.

APPENDIX I

PROPOSED AND ACTUAL SAMPLING OF THE FACILITIES

SUMMARY				Proposed		Achieved	
				# of facilities to be sampled at 90% confidence		# of facilities to be sampled at 90% confidence	
STATE	LGA	No. of facilities	No. of clusters	Hospital	Lower-Level	Hospital	Lower-Level
Bauchi	Bauchi	77	1	2	3	2	3
	Dambam	37		1	1	1	1
	Darazo	51		1	2	1	2
	Gamawa	54	1	1	3	1	3
	Shira	45		1	2	1	2
	T/Balewa	52		2	1	2	1
Benue	Agatu	50	1	1	2	0	3
	Buruku	36		1	2	0	3
	Guma	57		1	3	1	3
	Logo	28	1	1	2	0	3
	Makurdi	35		2	2	2	2
	Vandeikya	29		1	2	0	3
Sokoto	Gwadabawa	36	1	1	3	0	4
	Yabo	19		1	1	1	1
	Bodinga	30		1	3	1	3
	Gudu	13	1	0	2	0	2
	Rabah	21		1	3	0	4
	Sokoto South	11		2	2	2	2
Lagos	Alimosho	23	1	1	3	1	3
	Apapa	5		1	1	1	1
	Ibeju-Lekki	21		1	3	1	3

SUMMARY				**Proposed**		**Achieved**	
				# of facilities to be sampled at 90% confidence		***# of facilities to be sampled at 90% confidence***	
Cross River	*Abi*	*22*	*1*	*1*	*1*	*1*	*1*
	Boki	*53*		*0*	*4*	*0*	*4*
	Ogoja	*39*		*1*	*3*	*1*	*3*
TOTAL	**24**	**844**	**8**	**25**	**55**	**20**	**60**

APPENDIX 2

AIDSTAR-ONE 2011 BASELINE HEALTH FACILITY LIST

CODE	LGA	NAME OF HEALTH FACILITY	LEVEL
BAUCHI STATE			
A 1	Bauchi	Gudun PHC	Lower-level (LL)
A 2	Bauchi	Kagere Maternity	LL
A 3	Bauchi	Police Clinic	LL
A 4	Bauchi	Bauchi S H	Hospital (H)
A 5	Bauchi	Bayara General Hospital	H
A 6	Dambam	Dagauda PHC	LL
A 7	Dambam	Gen. Hosp. Dambam	H
A 8	Darazo	Darazo Health Center	LL
A 9	Darazo	Kari Health Center	LL
A 10	Darazo	General Hospital Darazo	H
A 11	Gamawa	Wabu Maternity	LL
A 12	Gamawa	Gadiya Modern Health Centre	LL
A 13	Gamawa	Gololo Model Health Clinic	LL
A 14	Gamawa	General Hospital Gamawa	H
A 15	Shira	Yana General Hospital	H
A 16	Shira	Disina PHC	LL
A 17	Shira	Foggo Mat/PHC	LL
A 18	Tafawa Balewa	Boto General Hospital	H
A 19	Tafawa Balewa	T/Balewa General Hospital	H
A 20	Tafawa Balewa	Gambar Health Clinic	LL
BENUE STATE			
B 1	Agatu	Aila Primary Health Centre	LL
B 2	Agatu	Okokolo Primary Health Centre	LL
B 3	Agatu	Obagaji Comprehensive Health Centre	LL
B 4	Buruku	Anvambe Primary Health Centre	LL
B 5	Buruku	Tyowanye Primary Health Centre	LL
B 6	Buruku	Utsombi Modern Primary Health Centre	LL
B 7	Guma	Leemp Clinic Angyom	LL
B 8	Guma	FSP Dauda	LL

CODE	LGA	NAME OF HEALTH FACILITY	LEVEL
B 9	Guma	HC Adai	LL
B 10	Guma	General Hospital, Guma	H
B 11	Logo	Ugba Comprehensive Centre	LL
B 12	Logo	Indyer LG Health Centre	LL
B 13	Logo	Anyiin Isaiah Memorial Comprehensive Health Centre	LL
B 14	Markurdi	Family Practice Comprehensive Health Centre	LL
B 15	Markurdi	Federal Medical Centre	H
B 16	Markurdi	North Bank General Hospital	H
B 17	Markurdi	Origbo Primary Health Centre	LL
B 18	Vandeikya	Tyam Community Health Centre	LL
B 19	Vandeikya	Tyemimongo LG Health Centre	LL
B 20	Vandeikya	Tse-Kpum Comprehensive Health Centre	LL
SOKOTO STATE			
C 1	Gwadabawa	Kangiye Dispensary	LL
C 2	Gwadabawa	RHC/General Hospital Gwadabawa	H
C 3	Gwadabawa	Zugana Dispensary	LL
C 4	Gwadabawa	Kalaba Dispensary	LL
C 5	Yabo	Toronkawa Dispensary	LL
C 6	Yabo	General Hospital Yobo	H
C 7	Bodinga	General Hospital Bodinga	H
C 8	Bodinga	PHC Danchadi	LL
C 9	Bodinga	Dingyadi Up-Graded Dispensary	LL
C 10	Bodinga	Kaura Buba Dispensary	LL
C 11	Gudu	PHC Balle	LL
C 12	Gudu	PHC Kurdula	LL
C 13	Rabah	Alikiru Dispensary	LL
C 14	Rabah	General Hospital Rabah	H
C 15	Rabah	PHC Gandi	LL
C 16	Rabah	Sabaru Dispensary	LL
C 17	Sokoto South	Gidan Dahala Dispensary	LL
C 18	Sokoto South	Specialist Hospital	H
C 19	Sokoto South	Mabera BHC	LL
C 20	Sokoto South	Maryam Abacha Women & Children Hospital	H
LAGOS STATE			
D 1	Alimosho	Ipaja PHC	LL
D 2	Alimosho	Agbado PHC	LL
D 3	Alimosho	Amikanle PHC	LL
D 4	Alimosho	General Hospital	H
D 5	Apapa	Ijora PHC	LL
D 6	Apapa	General Hospital Apapa	H

CODE	LGA	NAME OF HEALTH FACILITY	LEVEL
D 7	Ibeju Lekki	Orimedu PHC (24 hours)	LL
D 8	Ibeju Lekki	Awoyaya PHC	LL
D 9	Ibeju Lekki	Lekki PHC	LL
D 10	Ibeju Lekki	General Hospital	H
CROSS RIVER			
E 1	Abi	Isong Inyang	LL
E 2	Abi	Eja Memorial Hospital	H
E 3	Boki	Agba Osokom Health Centre	LL
E 4	Boki	PHC Isobendeghe	LL
E 5	Boki	H/P Ubong	LL
E 6	Boki	Okubushuyu HC	LL
E 7	Ogoja	Ekuano HC	LL
E 8	Ogoja	PHC Ekumtack	LL
E 9	Ogoja	Nkem H/C	LL
E 10	Ogoja	GH, Ogoja	H

APPENDIX 3

LIST OF REPLACEMENT FACILITIES USED IN THE SURVEY

Code	Local Government Area	Name of Health Facility	Level	Replacements
BAUCHI STATE				
A 1	Bauchil	Juwara Maternity	Lower-level (LL)	Gudun PHC (Dandango)
A 6	Dambam	Fagam Dispensary	LL	Dagauda PHC
A 8	Darazo	Kaugama Dispensary	LL	Darazo Health Center
A 9	Darazo	Lagon Wahu Dispensary	LL	Kari Health Center
A 11	Gamawa	Yada Dispensary Clinic	LL	Wabu Maternity
A 12	Gamawa	Kadikadi Dispensary Clinic	LL	Gadiya Modern Health Centre
A 13	Gamawa	Kaisawa Dispensary	LL	Gololo Model Health Clinic
A 16	Shira	Jahn Dispensary	LL	Disina PHC
A 17	Shira	Jama'a Dispensary	LL	Foggo Mat/PHC
BENUE STATE				
B 3	Agatu	General Hospital, Agatu	Hospital (H)	Obagaji Comprehensive Health Centre
B 6	Buruku	General Hospital, Buruku	H	Utsombi Modern Primary Health Centre
B 11	Logo	Wende Primary Health Centre	LL	Ugba Comprehensive Centre
B 13	Logo	General Hospital Logo	H	Anyiin Isaiah Memorial Comprehensive Health Centre
B 20	Vandeikya	Vandyeikya General Hospital	H	Tse-Kpum Comprehensive Health Centre
SOKOTO STATE				
C 10	Bodinga	PHC Bagarawa	LL	Kaura Buba Dispensary
C 11	Gudu	Kukoki Dispensary	LL	PHC Balle
C 12	Gudu	Chilas Dispensary	LL	PHC Kurdula
C 15	Rabah	Tsamiya Dispensary	LL	PHC Gandi
C 19	Sokoto South	Tudunwada Clinic	LL	Mabera BHC

LAGOS STATE				
D 8	Ibeju Lekki	Aboreji HP	LL	Awoyaya PHC
D 9	Ibeju Lekki	Okun Ise HP	LL	Lekki PHC
CROSS RIVER				
E 3	Boki	MCH Enyi Boje	LL	Agba Osokom Health Centre

APPENDIX 4

WORLD HEALTH ORGANIZATION TOOL C-REVISED

AIDSTAR-One Nigeria
AIDS SUPPORT AND TECHNICAL ASSISTANCE RESOURCES

HEALTH FACILITY BASELINE ASSESSMENT

Date: _____

Name of Facility: _____

Facility Code: _____

Address of Facility: _____

State: _____

LGA: _____

Type of Facility *(circle one)*: 1. Hospital 2. Lower-level

Name of Head of Institution: _____

Telephone No.:_____

Email: _____

Names of the Assessors: _____

_____

Name of Team Leader: _____

Name of Facility: _____ Facility Code: _____

SURVEY SECTION 1:

Structured Observations of the Facility

Complete these items based on your observations of the entire facility.

	Facility Observation Items	***Please circle "Yes," "No," or "N/A" (not applicable/not observed) for each item. If an item asks about a type of equipment that is not used at all in the facility, select "N/A."***
Q101	Are there any loose disposable **needles and syringes** inside the facility (for example, outside of packaging and not disposed of in a waste container)? *[Including standard disposable, auto-disable, and other safety syringes.]*	Yes No
Q102	Is there any loose disposable **phlebotomy equipment** (other than needles and syringes) inside the facility (for example, outside any packaging and not disposed of in a waste container)?	Yes No N/A
Q103	Is there any loose disposable **intravenous infusion equipment** inside the facility (for example, outside any packaging and not disposed of in a waste container)?	Yes No N/A
Q104	Is there any evidence that an attempt was made to sterilize disposable injection equipment for reuse? *[For example, needles and syringes in a steam sterilizer, autoclave, boiler, pot, or dish of water.]*	Yes No
Q105	If you answered "Yes" to Q104, describe what you saw.	_____ _____ _____ _____ _____ _____ _____ _____
Q106	Is there any infectious waste other than used sharps (for example, bloody swabs or dressings) that is not in an appropriate container? *[Infectious waste other than sharps should be placed in a container that is specific for non-sharps infectious waste. The type of container may vary by health system. If any infectious waste is not in any container, or is in an inappropriate container, answer "1. Yes."]*	Yes No

	Facility Observation Items	*Please circle "Yes," "No," or "N/A" (not applicable/not observed) for each item. If an item asks about a type of equipment that is not used at all in the facility, select "N/A."*
Q106A	If you answered "Yes" to Q106, describe what you saw.	_____ _____ _____
Q107	Is there any multi-dose vial with a needle left in the diaphragm? *[Be sure to look around the facility, especially where injections are prepared and in the fridge.]*	Yes No
Q108	Are there any overflowing or pierced sharps containers of any type in any area of the facility?	Yes No
Q109	Are there used sharps in an open container in any area of the facility? *[A standard safety box that does not have the top cardboard flaps folded over and inserted into the top of the box is an open container. Any other container with a wide opening at the top (wide enough to insert fingers and touch used sharps) also is an open container.]*	Yes No
Q110	Are there separate waste containers in each of the injection areas of the facility for each of the following types of waste: sharps, infectious, and non-infectious?	Yes No
Q111	Is there at least one puncture-resistant and leakproof sharps container in all areas where vaccinations are given?	Yes No
Q112	Is there at least one puncture-resistant and leakproof sharps container in all areas where therapeutic injections are given?	Yes No
Q113	Is there at least one puncture-resistant and leakproof sharps container in the area where phlebotomies are performed?	Yes No N/A
Q114	Is there at least one puncture-resistant and leakproof sharps container in areas where intravenous procedures are performed?	Yes No N/A
Q115	Is there one or more puncture-resistant and leakproof sharps container "in stock"? *["In stock" means in addition to those currently in use.]*	Yes No
Q116	Is there running water and soap for washing hands?	Yes No
Q117	Is there alcohol-based hand rub for cleansing hands?	Yes No
Q118	Are there reminders and/or job aids posted that promote reducing the use of injections, safe administration of injections, or safe disposal of used injection equipment at this facility?	Yes No

	Facility Observation Items		*Please circle "Yes," "No," or "N/A" (not applicable/not observed) for each item. If an item asks about a type of equipment that is not used at all in the facility, select "N/A."*
Q119	If you answered "Yes" to Q118, describe what you saw.		_____ _____ _____
Q120	Are **all** used sharps containers awaiting final destruction completely closed?		Yes No
Q121	Are full sharps containers stored in a locked area or otherwise stored safely away from public access?		Yes No
Q122	Are there any used sharps on the ground immediately outside the health facility or around the disposal site? *[Answer yes if there are any sharps outside of the facility around any of the buildings or on the ground.]*		Yes No
Q123	What types of final waste disposal are used for sharps at this facility? *[Select all that apply]* *Instructions: Multiple codes are permitted. Circle the answers that apply to this facility (for example: A + H for open burning on the ground hole followed by burial). Do not select "incinerator" if it is not working.*		Open burning on the ground Open burning in a hole or in an enclosure High- or medium-temperature incineration (two-chamber, Rotary Kiln, industrial, Demont forte or Waste Disposal Unit) Low-temperature incineration/burning (single-chamber, "Drum," brick) Burial Dumping in a protected (secure) pit (including a needle pit) Dumping in an unprotected pit Dumping in an unsupervised area Transportation for offsite treatment (specify what type of transportation) _____ Other (specify): _____
Q124	**Comments:** *[Enter anything you are concerned about that is not captured by the questionnaire.]*		

Name of Facility: _____ Facility Code: _____

SURVEY SECTION 2:

Structured Observations of Injection Practices

Up to four injections are to be observed and reported on in Survey Section 2. One injection of each of the following types that are performed during the facility evaluation should be included if possible: one vaccination, one therapeutic, one family planning, and/or one dental.

The fieldworker should ask where each type of injection might be performed and check with staff at each of these locations to see when injections are likely to occur on that day. If the facility has more than one location where a particular type of injection is performed, ask to be informed when and where the first injection of each type might be observed. If more than one location or department might perform the same type of injection at the same time, select outpatient over inpatient departments. Remember to verify what type of injection is about to be performed before entering data.

Injection Practices Observed		***Please circle "Yes," "No," or "N/A" (not applicable/not observed) in the designated column. Use a single column below to record all of your observations for a given injection. The goal is to observe ONE injection of each type that is provided in each service unit that is included in the survey.***			
		"A" Vaccination	***"B" Therapeutic***	***"C" Family Planning***	***"D" Dental***
Q201	Was the injection prepared on a visibly **clean, dedicated table or tray** where contamination of the equipment with blood, body fluids, or dirty swabs is unlikely?	Yes No	Yes No	Yes No	Yes No
Q202	Did the provider wash her/his hands before preparing an injection with **soap and running water?**	Yes No N/A	Yes No N/A	Yes No N/A	Yes No N/A
Q203	Did the provider cleanse her/his hands before preparing an injection by using **alcohol-based hand rub?**	Yes No N/A	Yes No N/A	Yes No N/A	Yes No N/A
Q204	Did any **patients bring their own syringe** and needle for the observed injection?	Yes No N/A	Yes No N/A	Yes No N/A	Yes No N/A

Injection Practices Observed		***Please circle "Yes," "No," or "N/A" (not applicable/not observed) in the designated column. Use a single column below to record all of your observations for a given injection. The goal is to observe ONE injection of each type that is provided in each service unit that is included in the survey.***			
		"A" Vaccination	***"B" Therapeutic***	***"C" Family Planning***	***"D" Dental***
Q205	What **type of syringe** was used for the injection you observed? 1. Standard disposable 2. Auto-disable 3. Retractable 3. Other safety syringe 4. Sterilizable 5. Disposable – type unknown (If 4 sterilizable, then go to Q205A; others go to Q206.)	1. 2. 3. 4. 5.	1. 2. 3. 4. 5.	1. 2. 3. 4. 5.	1. 2. 3. 4. 5.
Q205A	Are needles sterilizable?				Yes No
Q206	For this injection, was a **syringe and needle** taken from a **sterile unopened packet or fitted with caps**?	Yes No N/A	Yes No N/A	Yes No N/A	Yes No N/A
Q207	For each injection given with a **sterilizable syringe** and needle, were they **taken from a sterilizer** *(or sterile packs)* **using sterile technique**?				Yes No N/A
Q208	**For reconstitution**, was a syringe and needle each taken from a **sterile unopened packet or fitted with caps**? *[Instructions: Code as N/A (not applicable) if there was no reconstitution step.]*	Yes No N/A	Yes No N/A	Yes No N/A	Yes No N/A
Q209	Is reconstitution of a powdered vaccine or medicine performed using **diluent from the same manufacturer**?	Yes No N/A	Yes No N/A	Yes No N/A	Yes No N/A
Q210	If a multi-dose vial was used, did the **provider clean the rubber cap** with antiseptic?	Yes No N/A	Yes No N/A	Yes No N/A	Yes No N/A

	Injection Practices Observed	***Please circle "Yes," "No," or "N/A" (not applicable/not observed) in the designated column. Use a single column below to record all of your observations for a given injection. The goal is to observe ONE injection of each type that is provided in each service unit that is included in the survey.***			
		"A" Vaccination	***"B" Therapeutic***	***"C" Family Planning***	***"D" Dental***
Q210A	If a multi-dose vial was used, did the **provider clean the rubber cap** with a dirty swab?	Yes No N/A	Yes No N/A	Yes No N/A	Yes No N/A
Q211	If a multi-dose vial was used, was the **needle removed from the rubber cap of each multi-dose vial** after withdrawing each dose for administration? *[Instructions: Code as N/A (not applicable) if no multi-dose vials were used for the injection you observed.]*	Yes No N/A	Yes No N/A	Yes No N/A	Yes No N/A
Q212	If **glass ampoules** are used, was a **clean barrier** (e.g., small gauze pad or cotton) used to protect fingers when breaking the top from the glass ampoule? *[Instructions: If no glass ampoules were used, code as N/A (not applicable). If an unsafe procedure was used such as forceps, knife, or scissors, code as "no."]*	Yes No N/A	Yes No N/A	Yes No N/A	Yes No N/A
Q213	If using temperature sensitive vaccines or medications, is the vial kept between 2 to 8 degrees Celsius during the period of use? *[A vial that is in contact with a combination of ice and water will be between 2 and 8 degrees Celsius.]* *[Instructions: If no heat-sensitive vaccines and medication were used, code as N/A (not applicable).]*	Yes No N/A	Yes No N/A	Yes No N/A	Yes No N/A
Q214	Did the provider use a **new** pair of **gloves?** 1. New gloves used 2. Gloves not changed 3. No gloves used 4. Not observed	1. 2. 3. 4.	1. 2. 3. 4.	1. 2. 3. 4.	1. 2. 3. 4.

Injection Practices Observed		*Please circle "Yes," "No," or "N/A" (not applicable/not observed) in the designated column. Use a single column below to record all of your observations for a given injection. The goal is to observe ONE injection of each type that is provided in each service unit that is included in the survey.*			
		"A" Vaccination	***"B" Therapeutic***	***"C" Family Planning***	***"D" Dental***
Q215	What was the **patient's skin cleaned** with before the injection was given? 1. Water or a clean, wet swab 2. An antiseptic 3. Dry cotton 4. A dirty swab 5. The skin was not cleaned and it is clean 6. The skin was not cleaned and it is dirty 7. Not observed *[Select the most appropriate response.]* *[Instructions: If the provider used any unclean material to swab the skin including any swab soaking in a liquid, circle "4. A dirty swab".]*	1. 2. 3. 4. 5. 6. 7.	1. 2. 3. 4. 5. 6. 7.	1. 2. 3. 4. 5. 6. 7.	
Q216	Did the provider **re-cap** the used needle and syringe? 1. Yes, with one hand 2. Yes, with two hands 3. Not recapped 4. Not observed	1. 2. 3. 4.	1. 2. 3. 4.	1. 2. 3. 4.	1. 2. 3. 4.
Q217	Was a **needle remover** or needle destroyer used?	Yes No	Yes No	Yes No	Yes No
Q218	If disposable or safety syringe was used, did the provider **immediately dispose** of the needles and syringes used for the injection (and reconstitution if applicable) in an appropriate sharps container after the injection?	Yes No N/A	Yes No N/A	Yes No N/A	Yes No N/A
Q219	If **sterilizable equipment** was used, was the equipment **disassembled and immersed** in a container of water immediately after the injection?	Yes No N/A	Yes No N/A	Yes No N/A	Yes No N/A

Name of Facility: _____ Facility Code: _____

SURVEY SECTION 3:

Structured Observations of Phlebotomies (Blood Collection), Lancets, Intravenous Infusions, and Intravenous Injections

Up to four procedures are to be observed and reported on in Survey Section 3. One procedure of each of the following types that are performed during the facility evaluation should be included if possible: one phlebotomy, one lancet procedure, one intravenous injection, and one intravenous infusion.

The fieldworker should ask where each type of procedure might be performed and check with staff at each of these locations to see when procedures are likely to occur on that day. If the facility has more than one location where a particular type of procedure is performed, ask to be informed when and where the first procedure of each type might be observed. If more than one location or department might perform the same type of procedure at the same time, select outpatient over inpatient departments. Remember to verify what type of procedure is about to be performed before entering data.

Injection Practice/Blood Drawing Observed		***Please answer "Yes," "No," or "N/A" (not applicable/not observed) in the designated column. Use a single column below to record all of your observations for a given injection. The goal is to observe ONE injection of each type that is provided in each service unit that is included in the survey.***			
		"A" Phlebotomy (Blood Collection)	***"B" Lancets***	***"C" Intravenous Injections***	***"D" Intravenous Infusions***
Q301	Did the provider wash her/his hands before preparing an injection with **soap and running water?**	Yes No N/A	Yes No N/A	Yes No N/A	Yes No N/A
Q302	Did the provider cleanse her/his hands before preparing an injection by using **alcohol-based hand rub?**	Yes No N/A	Yes No N/A	Yes No N/A	Yes No N/A
Q303	Was the **procedure prepared on a clean, dedicated table or tray** where contamination of the equipment with blood, body fluids, or dirty swabs is unlikely?	Yes No	Yes No	Yes No	Yes No
Q304	Are any patients with an IV on a bed or stretcher with another patient?			Yes No N/A	Yes No N/A
Q305	If the patient has an existing IV catheter-site dressing, is it visibly soiled?	Yes No N/A	Yes No N/A	Yes No N/A	Yes No N/A

Injection Practice/Blood Drawing Observed		***Please answer "Yes," "No," or "N/A" (not applicable/not observed) in the designated column. Use a single column below to record all of your observations for a given injection. The goal is to observe ONE injection of each type that is provided in each service unit that is included in the survey.***			
		"A" Phlebotomy (Blood Collection)	***"B" Lancets***	***"C" Intravenous Injections***	***"D" Intravenous Infusions***
Q306	Did the provider **appropriately secure the patient** and the intended puncture site so that the patient could not move during the procedure?	Yes No	Yes No	Yes No	Yes No
Q307	Did the provider use a **new** pair of **gloves?** 1. New gloves used 2. Gloves not changed 3. No gloves used 4. Not observed	1. 2. 3. 4.	1. 2. 3. 4.	1. 2. 3. 4.	1. 2. 3. 4.
Q308	What was the **patient's skin cleaned** with before the injection was given? 1. Water or a clean, wet swab 2. An antiseptic 3. Dry cotton 4. A dirty swab 5. The skin was not cleaned and it is clean 6. The skin was not cleaned and it is dirty 7. Not observed *[Select the most appropriate response.]* *[Instructions: If the provider used any unclean material to swab the skin including any swab soaking in a liquid, circle "4. A dirty swab."]*	1. 2. 3. 4. 5. 6. 7.	1. 2. 3. 4. 5. 6. 7.	1. 2. 3. 4. 5. 6. 7.	1. 2. 3. 4. 5. 6. 7.
Q309	Did the provider palpate the venipuncture site after skin preparation with an antiseptic?	Yes No	Yes No	Yes No	Yes No

Injection Practice/Blood Drawing Observed		***Please answer "Yes," "No," or "N/A" (not applicable/not observed) in the designated column. Use a single column below to record all of your observations for a given injection. The goal is to observe ONE injection of each type that is provided in each service unit that is included in the survey.***			
		"A" Phlebotomy (Blood Collection)	***"B" Lancets***	***"C" Intravenous Injections***	***"D" Intravenous Infusions***
Q310	For the procedure observed what device was/were used? Holder/adapter and vacuum tubes Standard disposable needle and syringe Auto-disable syringe Retractable syringe Winged collection set Lancet Sterilizable needle or syringe	1. 2. 3. 4. 5. 6. 7.	1. 2. 3. 4. 5. 6. 7.	1. 2. 3. 4. 5. 6. 7.	1. 2. 3. 4. 5. 6. 7.
Q311	Was the **device** used **taken from a sterile unopened packet or fitted with caps**?	Yes No N/A	Yes No N/A	Yes No N/A	Yes No N/A
Q312	For each procedure performed on an IV system using a needle/syringe, was the IV system accessed from an IV port? *[That is, if any injections are administered directly into IV bags, plastic*	Yes No N/A		Yes No N/A	Yes No N/A
Q312 A	If you answered "No" to Q312, describe what you saw.	_____ _____ _____ _____	_____ _____ _____ _____	_____ _____ _____ _____	_____ _____ _____ _____
Q313	If the IV solution is in a glass bottle, did the provider first clean the rubber stopper on the bottle top with an alcohol pad before inserting the spike through the rubber			Yes No N/A	Yes No N/A
Q314	Were injection ports cleansed with CHG 2 percent, povidone-iodine, or alcohol before accessing the intravenous system?	Yes No N/A		Yes No N/A	Yes No N/A
Q315	If a holder/adapter was used, was there blood on it before it was used for performing a phlebotomy?	Yes No N/A			

Injection Practice/Blood Drawing Observed		***Please answer "Yes," "No," or "N/A" (not applicable/not observed) in the designated column. Use a single column below to record all of your observations for a given injection. The goal is to observe ONE injection of each type that is provided in each service unit that is included in the survey.***			
		"A" Phlebotomy (Blood Collection)	***"B" Lancets***	***"C" Intravenous Injections***	***"D" Intravenous Infusions***
Q316	Did the provider remove an uncapped needle from any device using only her/his hands? *[If the provider did not remove any needles from devices, or only removed a capped needle from a device, select*	Yes No	Yes No	Yes No	Yes No
Q317	Did the provider re-cap a needle using two hands at any stage of the procedure?	Yes No	Yes No	Yes No	Yes No
Q318	If the provider transferred blood from a syringe/needle into a vacuum tube by inserting the needle directly into the tube, did she/he use a two-handed transfer technique? *[If there was no direct transfer of blood from a syringe/needle to a vacuum tube, select N/A (not applicable).]*	Yes No N/A			
Q319	For each procedure, was the used sharp immediately disposed of into a sharps container?	Yes No N/A	Yes No N/A	Yes No N/A	Yes No N/A
Q320	Immediately after the procedure, did the provider dispose of non-sharps infectious waste in an appropriate container?	Yes No N/A	Yes No N/A	Yes No N/A	Yes No N/A
Q321	Was a needle remover or needle destroyer used?	Yes No	Yes No	Yes No	Yes No
Q322	If any sterilizable equipment was used, was the equipment immediately disassembled after the procedure using forceps?	Yes No N/A	Yes No N/A	Yes No N/A	Yes No N/A
Q322 A	After disassembling, was the equipment immediately immersed in a container of liquid?	Yes No N/A	Yes No N/A	Yes No N/A	Yes No N/A
Q323	After the procedure, did the provider use a clean gauze pad and **gently apply pressure to the puncture site to stop bleeding**?	Yes No	Yes No	Yes No	Yes No

Injection Practice/Blood Drawing Observed		***Please answer "Yes," "No," or "N/A" (not applicable/not observed) in the designated column. Use a single column below to record all of your observations for a given injection. The goal is to observe ONE injection of each type that is provided in each service unit that is included in the survey.***			
		"A" Phlebotomy (Blood Collection)	***"B" Lancets***	***"C" Intravenous Injections***	***"D" Intravenous Infusions***
Q324	If a hematoma developed during a procedure, did the provider terminate the procedure and apply pressure to the hematoma to prevent its expansion?	Yes No N/A		Yes No N/A	Yes No N/A
Q325	Did the provider **cleanse the work area** with disinfectant **after the procedure if there is blood or body fluid contamination**? *[If there was no blood or body fluid contamination of the work area during the procedure circle, "N/A."]*	Yes No N/A	Yes No N/A	Yes No N/A	Yes No N/A
Q326	**After the procedure, did the provider cleanse her/his hands** by washing with soap and clean water or using alcohol-based hand rub?	Yes No	Yes No	Yes No	Yes No

Name of Facility: _____ Facility Code: _____

SURVEY SECTION 4:

Structured Observations of Sterilization Practices

This section is intended for health facilities that still use sterilizable injection equipment.

	Sterilization Practices	Observation
Q401	**Is steam sterilization being used** to sterilize any devices used for injections, venous phlebotomies, or intravenous procedures? *[Ask staff whether steam sterilization is used and to show you the sterilizer(s) and make observations, selecting "1. Yes" if staff informs you that sterilization is used or you observe evidence of its occurrence.]*	Yes No [go to Q405] Do not know
Q402	Is the **seal on the sterilizer** currently used **intact**?	Yes No Do not know/not sure
Q403	Is there an **updated TST** (temperature, steam, time) **spot register** for at least one sterilizer?	Yes No
Q404	If there is no updated TST spot register, ask for a sterilization to be performed and indicate whether or not there was any steam leak observed.	There was no steam leak There was a steam leak Not applicable (e.g., there was an updated TST spot register)
Q405	**Is any other sterilization method being used** to sterilize devices used for injections, venous phlebotomies, or intravenous procedures?	Yes No
Q405a	If you answered "Yes" to Q405, specify method.	_____ _____
Q406	Are there any **sterilizable needles and syringes outside of a sterilizer,** not currently in use, and not dismantled and immersed in water? *[Needles and syringes currently in use might be laid on a clean dedicated area for preparation or performing a procedure.]*	Yes No N/A
Q407	Is there any evidence that indicates **boiling or another cleansing method is used** instead of sterilization?	Yes If yes, describe the evidence: _____ _____ No
Q408	Is there any evidence that indicates there have been attempts at **cleaning or sterilizing disposable devices**?	Yes No

Name of Facility: _____ Facility Code: _____

SURVEY SECTION 5:

Interview of a Provider

In Section 5, interview one injection provider in each lower level facility and one for each procedure observed in Sections 2 and 3 (maximum of eight) in each hospital. If possible, interview the provider who performed most of the injections observed. Interview this person after you complete the observations unless you have waited the full three hours and no more injections are expected.

If it is not possible to interview the provider who performed most of the observed injections, and if there is more than one provider present in the facility on the day of the interview, ask to interview the provider who administers the most injections in the same unit or area where you observed most of the injections.

The interviews of the provider should be conducted in as private a setting as you can find and must be done individually. Data collectors should introduce themselves and explain the purpose of the survey, saying that we are trying to find ways that our project can support the health services to improve injection safety to protect providers and the community from unsafe injections and used equipment. Inform the person that the interview will take about 10 minutes, the data you collect are confidential, and that he/she will not be identified by name. Then request permission to conduct the interview.

Do not ask or write down the name of the person you are interviewing. If the person refuses to participate, accept the refusal and request to interview a different provider who is giving injections at the time of your visit if another one is available. If no one else is available or willing, report to your supervisor that the interview could not be completed at that department in that facility.

This section is based on the injection provider's answers only.

	Interview of a Provider	**Response**
Q501	What type of health care provider is being interviewed?	Nurse Physician Laboratory scientist/technician Community health officer/community health extension worker Dentist Other *(specify)*: _____
Q501A	What was your age at your last birthday?	< 20 21–30 31–40 41–50 51–60 > 60
Q501B	Gender	Male Female

	Interview of a Provider	Response
Q501C	How many years of post-qualification experience do you have?	1. < 1 year 2. 1–10 years 3. 11–20 years 4. 21–30 years 5. > 30 years
Q502	Do you use any sterilizable needles and syringes to administer injections in this unit/department/facility?	Yes No Do not know/not applicable to the provider
Q503	Do you use any sterilizable needles and syringes during performance of phlebotomies (blood collection) at this unit/department/facility?	Yes No Do not know/not applicable to the provider
Q504	Do you use any sterilizable equipment during performance of intravenous injections or infusions at this unit/department/facility? *[Consider sterilizable injection equipment used in injections administered into intravenous systems as well as other sterilizable equipment.]*	Yes No Do not know/not applicable to the provider
Q505	In the last six months, have clients brought their own injection devices for an immunization at this unit/department/facility?	Always Sometimes Never Not applicable
Q506	In the last six months, have patients brought their own injection devices for a therapeutic injection at this unit/department/facility?	Always Sometimes Never Not applicable
Q507	In the last six months, have patients brought their own injection devices for a contraceptive injection at this unit/department/facility?	Always Sometimes Never Not applicable
Q508	Are you aware of any needles and syringes for sale outside your facility?	Yes No Do not know
Q509	Have there been any stockouts of puncture-resistant sharps containers during the last six months in this unit/department/facility?	Yes No
Q510	Have you used a needle remover or needle destroyer in this unit/department/facility during the last six months?	Yes No Do not know
Q511	Are guidelines outlining all post-exposure management procedures available? *If yes, ask to see the document, Comments:* _____ _____	Yes No Do not know

	Interview of a Provider	Response
Q512	Is there support and counseling for blood and body fluid exposures?	Yes No Do not know
Q513	Where possible, is post-exposure prophylactic medication for high-risk exposures provided?	Yes No Do not know
Q514	How many accidental needle-stick or sharps injuries have you had (with used equipment) in the last six months? *[Allow the provider to state a number without prompting.]*	Number _____ *(If Q514=0, go to Q518.)*
Q515	If you have had any needle-stick or sharps injuries (with used equipment) in the last six months, did you report the injury to your supervisor, or whoever is in charge of reports of needle-stick injuries?	Yes No *[If "yes," ask Q516; if "no," go to Q517.]*
Q516	If you reported your most recent needle-stick or sharps injury, were you offered infectious disease testing?	Yes No
Q517	If you had accidental needle-stick or sharps injury, did you go for infectious disease testing on your own?	Yes No
Q518	Was training regarding injection safety available to you within the last two years in a formal lecture or workshop?	Yes No
Q519	Can you tell me the names of diseases that are transmitted to health workers and patients by unsafe injections? *[Circle all that apply. Let the provider respond without prompting with any of the answers.]*	Hepatitis B Hepatitis C HIV Others *(specify)*: _____ Do not know
Q520	Have you yourself ever received the vaccine against hepatitis B? *[One or more.]*	Yes No I cannot remember
Q521	If yes, how many hepatitis B vaccine doses have you received? *[Let the provider respond without prompting with any of the answers.]*	One Two Three or more I cannot remember

Name of Facility: _____ Facility Code: _____

SURVEY SECTION 6:

Interview of a Supervisor of Injection Providers

In Section 6, interview one supervisor of injection providers in each lower-level facility and one supervisor for each provider interviewed in Section 5 (maximum of eight) in each hospital. Interview the supervisor of the provider who performed most of the injections (Section 2) and other procedures (Section 3) observed if possible, or as a second priority select the supervisor of the unit(s) in which most of the injections and other procedures were observed. If either of these two options is not possible, select the supervisor of the unit or area that performs the most injections and other procedures. Interview this person after you complete the observations unless you have waited the full three hours and no more injections are expected.

If there is no supervisor working at the facility, you may interview the senior injection provider on site.

The interview of the supervisor should be conducted in as private a setting as you can find and must be done individually. Data collectors should introduce themselves and explain the purpose of the survey, saying that we are trying to find ways that our project can support the health services to improve injection safety to protect patients, providers, and the community from unsafe injections and used equipment. Inform the person that the interview will take about 10 minutes, the data you collect are confidential, and that he/she will not be identified by name. Then request permission to conduct the interview.

Do not ask or write down the name of the person you are interviewing. If the person refuses to participate, accept the refusal and request to interview a different supervisor at the time of your visit if another one is available. If no one else is available or willing, report to your supervisor that the interview could not be completed at that facility.

This section is based on the supervisor's answers only, not your observations.

Questions	Interview of a Supervisor	Response
Q600	What type of health care provider is being interviewed?	Nurse Physician Laboratory scientist/technician Community health officer/community health extension worker Dentist Other *(specify)*:_____
Q600A	What was your age at your last birthday?	< 20 21–30 31–40 41–50 51–60 > 60
Q600B	Gender	Male Female

Questions	Interview of a Supervisor	Response
Q600C	How many years of post-qualification experience do you have?	< 1 year 1–10 years 11–20 years 21–30 years > 30 years
Q601	Are there any injection safety policy/guidelines/standard operating procedures by the ministry or other government agencies available in your unit/department/facility? If so, can you show it to me?	Yes, and it was shown Yes, but it was not shown No, there is no policy Do not know
Q602	Is there a health care waste disposal policy/guidelines/standard operating procedures by the ministry or other government agencies available in your unit/department/facility? If so, can you show it to me?	Yes, and it was shown Yes, but it was not shown No, there is no policy Do not know
Q603	On average, how many immunizations are performed per week in this unit/department/facility? *[At any stage of administration (i.e., cumulative number each week).]*	Number: _____ N/A *(if no immunization given)*
Q604	On average, how many therapeutic injections are performed per week in this unit/department/facility? *[At any stage of administration (i.e., cumulative number each week).]*	Number: _____ N/A *(if no therapeutic injections given)*
Q605	On average, how many phlebotomies (blood collection) are performed per week in this unit/department/facility? *[At any stage of administration (i.e., cumulative number each week).]*	Number: _____ N/A *(if no phlebotomies performed)*
Q605A	On average how many lancet procedures are performed per week in this unit/department/facility? *[At any stage of administration (i.e., cumulative number each week).]*	Number: _____ N/A *(if no lancet procedures performed)*
Q606	On average, how many intravenous infusions are performed each week at this unit/department/facility? *[At any stage of administration (i.e., cumulative number each week).]*	Number: _____ N/A *(if no intravenous infusions are performed)*
Q607	On average, how many intravenous injections are performed each week at this unit/department/facility? *[At any stage of administration (i.e., cumulative number each week).]*	Number: _____ N/A *(if no intravenous injections are performed)*
Q608	In this unit/department/facility, are any sterilizable syringes and needles used for performing any procedures?	Yes No Do not know *(If no, skip to Q610.)*

Questions	Interview of a Supervisor	Response
Q609	If sterilizable equipment was used in the last six months, was there any point when fuel or power to run the sterilizer was not available? If yes, how long in total was it not available? *(Note to interviewer—check the fuel supply to the generator for the last six months.)*	Fuel was always available Less than one month One to three months Four to six months Not applicable/no sterilizable equipment
Q610	In the last six months, if there have been any stockouts of disposable injection equipment or safety syringes in any of the units that you supervise, for how long in total were you out of stock?	Stock was always available Less than one month One to three months Four to six months Not applicable Do not know/do not remember
Q611	In the last six months, if there have been any stockouts of disposable phlebotomy (blood collection) needles used with holder/adapters in any of the units that you supervise, for how long in total were you out of stock?	Stock was always available Less than one month One to three months Four to six months Not applicable/do not use disposable needles with holder/adapters Do not know/do not remember
Q612	In the last six months, if there have been any stockouts of disposable syringes/needles used for phlebotomy (blood collection) in any of the units that you supervise, for how long in total were you out of stock?	Stock was always available Less than one month One to three months Four to six months Not applicable/do not use disposable syringes/needles for phlebotomy Do not know/do not remember
Q612A	In the last six months, if there have been any stockouts of lancets used for blood collection in any of the units that you supervise, for how long in total were you out of stock?	Stock was always available Less than one month One to three months Four to six months Not applicable/do not use disposable syringes/needles for phlebotomy Do not know/do not remember
Q613	In the last six months, if there have been any stockouts of equipment for intravenous infusions in any of the units that you supervise, for how long in total were you out of stock?	Stock was always available Less than one month One to three months Four to six months Not applicable/do not do infusions Do not know/do not remember
Q614	In the last six months, if there have been any stockouts of puncture-resistant sharps containers in any of the units that you supervise, for how long in total were you out of stock?	Stock was always available Less than one month One to three months Four to six months Not applicable Do not know/do not remember

Questions	Interview of a Supervisor	Response
Q615	Which kind of protective equipment is available to those that handle health care waste? *[Indicate all that apply.]*	None Latex gloves Heavy-duty gloves Boots Nose mask Apron Overalls Other *(specify)*:_____
Q616	Are there designated staff that dispose of health care waste?	Yes *[go to Q617]* No *[go to Q618]* Do not know *[go to Q618]*
Q617	Has the designated staff that handles health care waste received any formal training in waste management?	Yes No Do not know
Q618	When you run short of injection equipment, is there a way to place an emergency order for equipment?	Yes No *(go to Q621)*
Q619	Have you placed any emergency orders for injection equipment in the last six months?	Yes No *(go to Q621)*
Q620	If you have placed an emergency order for injection equipment, how long did it take for the order to arrive?	Less than a week One or two weeks More than two weeks Not applicable Do not know/do not remember
Q621	If you have had shortages of injection equipment in the past and there is no protocol for placing an emergency order, how did you deal with that situation?	Write in response: _____ _____ _____ _____
Q622	Is there an infection prevention and control committee in your facility?	Yes No
Q623	Where possible, is post-exposure prophylactic medication for high-risk exposures provided?	Yes No
Q624	If you answered "Yes" to Q623, specify what kind of prophylaxis is offered.	_____ _____
Q625	Are records maintained for occupational exposures in your facility? *[If yes, request to see the records.]*	Yes No

Name of Facility: _____ Facility Code: _____

SURVEY SECTION 7:

Structured Observations of Disposable Equipment of Injections

	Disposable Equipment Tabulations	Circle the best answer
Q701	Is the number of auto-disable syringes available at the procedure site and in stock together greater than two times the response given for Q603? *[That is, at least enough for two weeks of immunizations according to the interview of the supervisor.]*	Yes No N/A *(No vaccination activity)*
Q702	Is the number of disposable and safety syringes available at the procedure site and in stock together greater than two times the response given for Q604? *[That is, enough for two weeks according to the interview of the supervisor.]* *[Safety syringes have a reuse prevention feature, as is the case for AD and retractable syringes.]*	Yes No
Q703	Is the number of disposable needles and syringes and holder/adapter needles available at the procedure site and in stock together greater than two times the response given for Q605? *[That is, at least enough for two weeks of phlebotomies according to the interview of the supervisor.]*	Yes No N/A *(No phlebotomy procedures)*
Q703A	Is the number of lancets available at the procedure site and in stock together greater than two times the response given for Q605? *[That is, at least enough for two weeks of phlebotomies according to the interview of the supervisor.]*	Yes No N/A *(No lancet procedures)*
Q704	Is the number of disposable intravenous cannula available at the procedure site greater than two times the response for Q606? *[That is, enough for two weeks according to the interview of the supervisor.]*	Yes No N/A *(No IV injections or infusions)*
Q705	Is the number of intravenous sets available at the procedure site greater than two times the response for Q606? *[That is, enough for two weeks according to the interview of the supervisor.]*	Yes No N/A *(No IV injections or infusions)*

Name of Facility _____ Facility Code: _____

SURVEY SECTION 8:

Interview of Waste Handler

Instructions: This section is based on the waste handler's answers only. If more than one is present on the day of the interview, interview the one who is the primary person in charge of managing health care waste. Only one form will be filled out per facility.

	Interview of Waste Handler	Circle best answer
Q801	What was your age at your last birthday?	< 20 21–30 31–40 41–50 51–60 > 60
Q802	Gender	Male Female
Q803	Have you received any training on handling waste, such as safer ways of handling and disposing waste?	Yes No
Q804	What protective equipment (if any) is available for waste handlers at this facility? *Instructions: Circle all that are mentioned.* ***Do not read the list aloud****.*	None Latex gloves Heavy-duty gloves Boots Nose mask Apron Overalls Other *(specify)*: _____
Q805	Have you had accidental needle-stick or sharps injuries (with used equipment) in the last six months?	Yes No *(go to Q809)*
Q806	If you have had any needle-stick or sharps injuries (with used equipment) in the last six months, did you report the injury to your supervisor?	Yes *(go to Q807)* No *(go to Q808)*
Q807	If you reported your most recent needle-stick or sharps injury, were you offered any testing?	Yes No *(go to Q809)*
Q808	If you had accidental needle-stick or sharps injury, did you go for infectious disease testing on your own?	Yes No
Q809	Have you ever received the vaccine against hepatitis B? *[One or more doses.]*	Yes No I cannot remember
Q810	If yes, how many hepatitis B vaccine doses have you received? *[Let the waste handler respond without prompting with any of the answers.]*	One Two Three or more I cannot remember

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